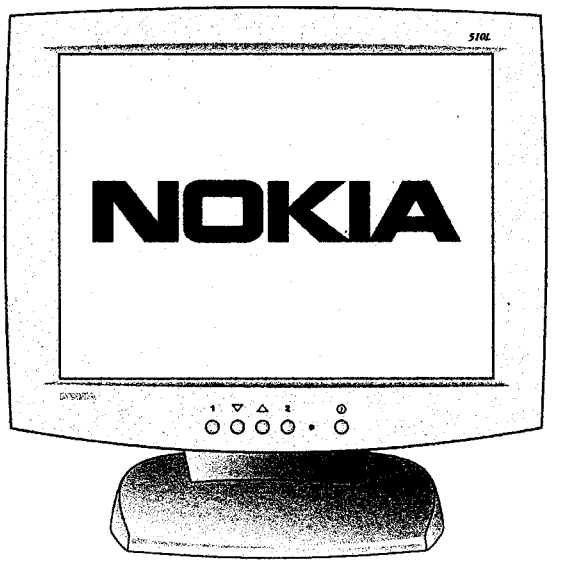
VIDE-V27594

Service Manual

NOKIA 510L

Model No. VLCDS21572-6

15" Color TFT LCD Display



(510L_SM_108 - Rev. 1 – September 2000)

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Revision History

Revision	Date	Description Of Changes	Approval
1.0	9/15/00	Initial Issue – DCN686	T. Sears

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FCC INFORMATION
This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause unacceptable interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures -- reorient or relocate the receiving antenna; increase the separation between equipment and receiver; or connect the unit into an outlet on a circuit different from that to which the receiver is connected.

FCC WARNING
To assure continued FCC compliance, the user must use a grounded power supply cord and the provided shielded video interface cable with bonded ferrite cores. Any unauthorized changes or modification will void the user's authority to operate this device. Thus ViewSonic Corporation will not be held responsible for the product and its safety.

CE CERTIFICATION
This device complies with the requirements of the EEC directive 89/336/EEC with regard to "Electromagnetic compatibility."

SAFETY CAUTION
Use a power cable that is properly grounded. Always use the AC cords as follows – USA (UL); Canada (CSA); Germany (VDE); Switzerland (SEV); Britain (BASEC/BS); Japan (Electric Appliance Control Act); or an AC cord that meets the local safety standards.

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FEATURES

The Nokia 510L is an advanced TFT LCD analog display that includes the following features.

1. On Screen Display Controls
   User friendly buttons [1, Select (▼/▲), 2, Power] allowing for picture perfect quality. User can define display mode or reset to default settings. Help menu contains : Auto-Sync; Auto Contrast; Contrast; Brightness; ViewMatch Color; LCD Adjust; Language and MISC.

2. Power Supply Support
   Ability to accept voltages from 100~240 Vac (Universal), thus allowing a full range of AC power supply input.

3. Power Saving System
   This environmental friendly product is able to reduce power consumption by more than 90% in the "Active Off" Mode.

4. Frequency Range
   Supports video standards from VGA to XGA, with Horizontal frequency ranges from 30~62kHz and Vertical frequency ranges from 50~75 Hz.

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SPECIFICATIONS

Characteristic	Description
LCD Panel	15.0 inch diagonal viewable screen, Anti-glare TFT Active Matrix Panel, 0.297 mm pixel pitch, TDK Inverter
Maximum Viewing Angles	Horizontal : 120° CR>10 Vertical : 100° CR>10
Signal Input	Video : RGB analog, 0.7 Vp-p, 75 ohms Sync : H/V separate or composite sync, TTL Horizontal : 30~62 kHz Vertical : 50~75 Hz
Connector	15 Pin Mini D-Sub
Maximum Resolution	1024x768
Video Bandwidth	100 MHz nominal
Display Area	304.1mm (H) x 228.1mm (V)
Power Voltage	100~240Vac @ 50 ~ 60 Hz (auto switch), 12Vdc 3A
Power Consumption	38 W max.
Operating Conditions	Temperature : 32 to 104 (0 to 40) Humidity : 10% to 90% (no condensation) Altitude : To 10,000 feet
Storage Conditions	Temperature : -4 to +140 (-20 to +60) Humidity : 10% to 90% (no condensation) Altitude : To 40,000 feet
Dimensions	Physical : 390mm (W) x 372mm (H) x 152mm (D)
Weight	5.0 kgs

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ON SCREEN DISPLAY

OSD (On Screen Display) function is supported and controlled by four easy to use buttons – [1], Select ▼, Select ▲, [2], Power.

Menu	Sub-Function	Value type
Auto Sync		
Auto Contrast		
Contrast		Adjustment Bar
Brightness		Adjustment Bar
ViewMatch Color	Preset 1	
	Preset 2	
	Red	Adjustment Bar
	Green	Adjustment Bar
	Blue	Adjustment Bar
LCD Adjust	H Size	Adjustment Bar
	H-Position	Adjustment Bar
	V-Position	Adjustment Bar
	Fine Tune	Adjustment Bar
	Auto Sync	
Language	English	
	Francais	
	Deutch	
	Suomi	
	Espanol	
MISC	H OSD Position	Adjustment Bar
	V OSD Position	Adjustment Bar
	Smoothing	ON/OFF
	Background	ON/OFF
	ViewMeter	
	Recall	

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FACTORY PRESET TIMINGS

This chart lists the preset timings for the TFT LCD analog display.

Timing	Horizontal Polarity	Horizontal Frequency	Vertical Polarity	Vertical Frequency
VGA 640x350	+	31.47 kHz	-	70.09 Hz
VGA 720x400	-	31.47	+	70.08
VGA 640x400	-	31.47	+	70.09
VGA 640x480	-	31.47	-	59.94
VESA 640x480	-	37.86	-	72.81
VESA 640x480	-	37.50	-	75.00
MAC 640x480	-	35.00	-	66.67
VESA 800x600	+	35.16	+	56.25
VESA 800x600	+	37.88	+	60.32
VESA 800x600	+	48.08	+	72.19
VESA 800x600	+	46.88	+	75.00
VESA 1024x768	-	48.36	-	60.00
VESA 1024x768	-	56.48	-	70.07
VESA 1024x768	-	58.04	-	71.92
VESA 1024x768	+	60.02	+	75.03
MAC 1024x768	-	60.24	-	74.93

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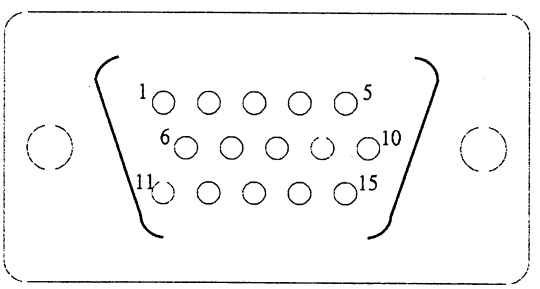
PIN ASSIGNMENT

This TFT LCD analog display uses a 15 Pin Mini D-Sub connector as video input source.

Pin	Description
1	Red
2	Green
3	Blue
4	Ground
5	Ground
6	R-Ground
7	G-Ground
8	B-Ground
9	No Connection
10	Ground
11	No Connection
12	(SDA)
13	H-Sync (Composite Sync)
14	V-Sync
15	(SCL)



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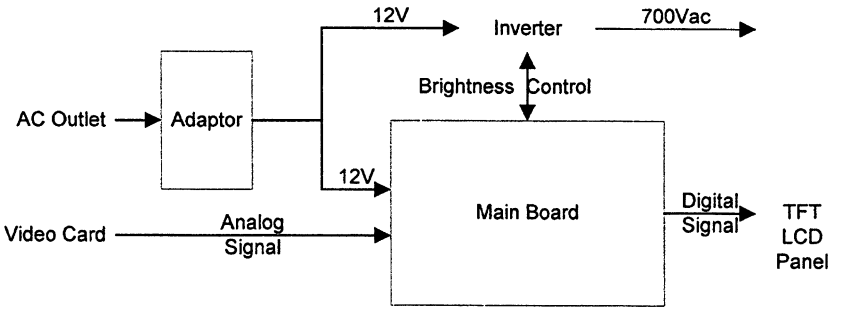
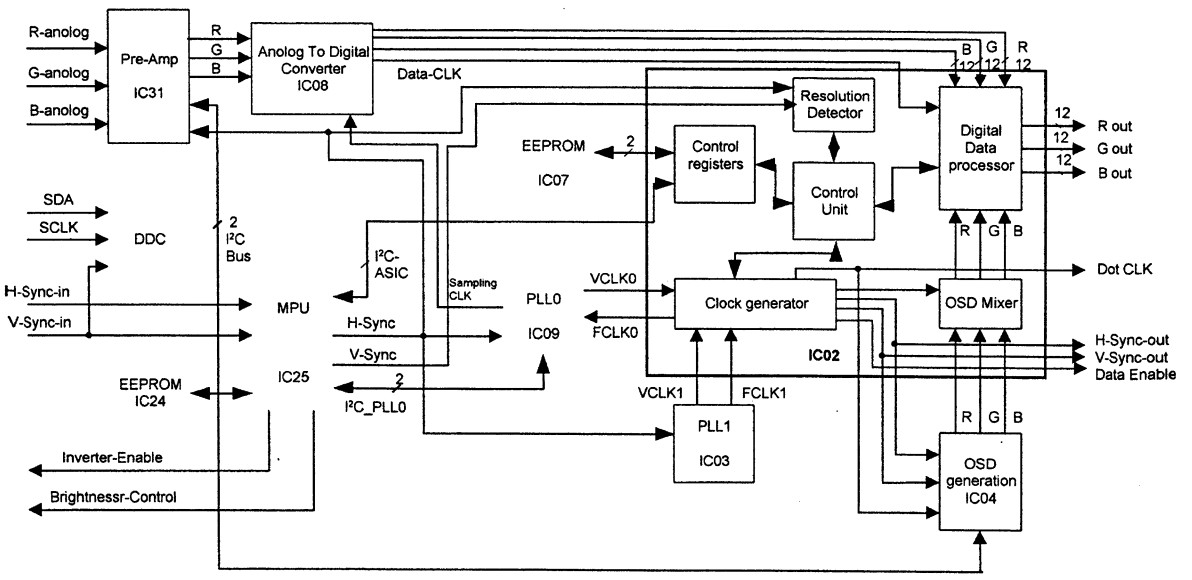
BLOCK DIAGRAM

COMPLETE TFT LCD DISPLAY UNIT



MAIN BOARD (TFT LCD DISPLAY ANALOG INTERFACE CONTROL BOARD)



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MAIN BOARD I/O CONNECTIONS

W04 CONNECTION (RIGHT LEFT) "OSD CONTROL"

Pin	Description
1	"-" Key
2	" Function " Key
3	"+" Key
4	Recall
5	LED 1
6	LED 2
7	Ground
8	Power 1
9	Power 2

W05 CONNECTION (LEFT RIGHT) "INVERTER CONTROL"

Pin	Description
1	+12V
2	Ground
3	V Enable
4	CON
5	No Connection

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MAIN BOARD I/O CONNECTIONS

W07 CONNECTION "VIDEO SIGNAL OUT TO LCD PANEL"

Pin	Description
1	N.C.
2	N.C.
3	N.C.
4	N.C.
5	Red Odd Data Signal (LSB)
6	Ground
7	Red Odd Data Signal
8	Red Odd Data Signal
9	Red Odd Data Signal
10	Red Odd Data Signal
11	Red Odd Data Signal
12	Red Odd Data Signal
13	Ground
14	Red Odd Data Signal (MSB)
15	Green Odd Data Signal
16	Green Odd Data Signal (LSB)
17	Green Odd Data Signal
18	Green Odd Data Signal
19	Green Odd Data Signal
20	Green Odd Data Signal
21	Green Odd Data Signal (MSB)
22	Green Odd Data Signal
23	Blue Odd Data Signal (LSB)
24	Ground
25	Blue Odd Data Signal
26	Blue Odd Data Signal
27	Blue Odd Data Signal
28	Blue Odd Data Signal
29	Blue Odd Data Signal
30	Blue Odd Data Signal

Pin	Description
31	Ground
32	Blue Odd Data Signal (MSB)
33	Red Even Data Signal
34	Red Even Data Signal (LSB)
35	Red Even Data Signal
36	Red Even Data Signal
37	Red Even Data Signal
38	Red Even Data Signal
39	Red Even Data Signal (MSB)
40	Red Even Data Signal
41	Green Even Data Signal (LSB)
42	Ground
43	Green Even Data Signal
44	Green Even Data Signal
45	Green Even Data Signal
46	Green Even Data Signal
47	Green Even Data Signal
48	Green Even Data Signal
49	Ground
50	Green Even Data Signal (MSB)
51	Blue Even Data Signal
52	Blue Even Data Signal (LSB)
53	Blue Even Data Signal
54	Blue Even Data Signal
55	Blue Even Data Signal
56	Blue Even Data Signal
57	Blue Even Data Signal (MSB)
58	Blue Even Data Signal
59	Ground
60	Ground

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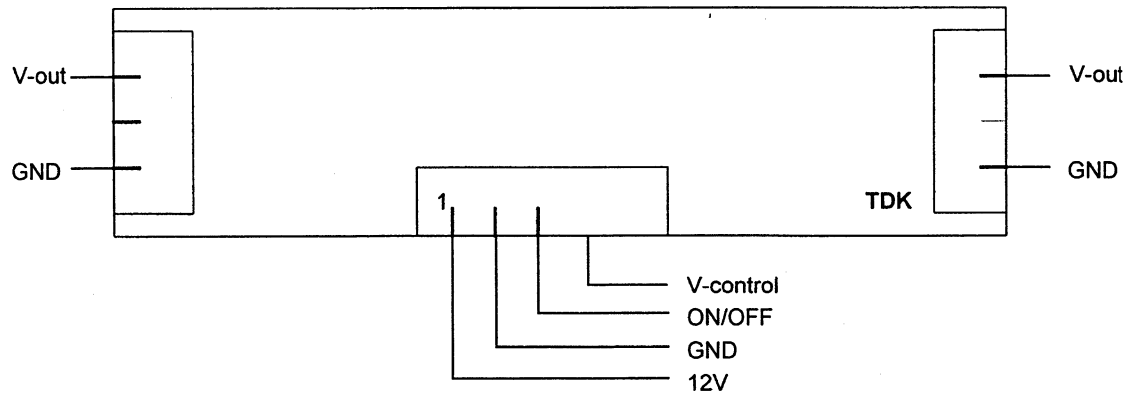
MAIN BOARD I/O CONNECTIONS

W07 CONNECTION "VIDEO SIGNAL OUT TO LCD PANEL"

Pin	Description
61	V Sync Signal
62	Ground
63	Data Enable Signal
64	H Sync Signal
65	Ground
66	Ground
67	Dot Clock
68	Dot Clock
69	Ground
70	Ground

Pin	Description
71	Power of LCD
72	Power of LCD
73	Power of LCD
74	Power of LCD
75	N.C.
76	N.C.
77	N.C.
78	N.C.
79	N.C.
80	N.C.

INVERTER BOARD I/O CONNECTIONS



NOTE: MANUFACTURER'S NAME MUST BE ON THE PRINTED SIDE FOR THE INVERTER BOARD TO BE FACING UP.

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THEORY OF CIRCUIT OPERATION

The Nokia 510L is a multi-frequency and multi-mode color TFT LCD monitor. It supports true XGA resolution of 1024x768 including SVGA, VGA and other various high resolution modes up to 1024x768 for IBM, PC compatibles, Power PC and Macintosh. The TFT LCD panel, with a 0.297 mm pixel pitch, provides for flicker-free images.

As the previous block diagram illustrates, the Nokia 510L uses the Analog Interface Controller (IC02) ASIC for mode detection and resolution amplifying from its preset values. The purpose of the two sets of PLL is to provide the clock from multiple horizontal synchronous frequencies. PLL0 provides A/D converter's sampling clock through ICS1523 (IC09) while PLL1 produces the LCD panel's dot clock through TLC2933 (IC03).

Furthermore, this TFT LCD monitor uses the 24C08 (IC24) chip to provide DDC1, DDC2B™ with Plug&Play. Also included in this monitor is the mode detection feature to examine the H-Sync frequency input level to decide for power saving mode. Power saving will shut down certain components, including excess electrical power to reduce power consumption.

Upon receiving video signal input, the Analog Interface Controller will trigger the mode detection function such that the internal controller can use the ROM's preset information to drive the Analog Interface Controller. In addition, the preset values can determine A/D converter clock; LCD dot clock; line buffer input/output rate; V-Sync and H-Sync pulse width; back porch and front porch to provide optimal performance for the TFT LCD monitors.

MPU allows users to control OSD menu values to change monitor settings that includes fine tune, contrast, brightness, color, H/V position, and H size. The following sections are a breakdown of the TFT LCD display control board's major sections.

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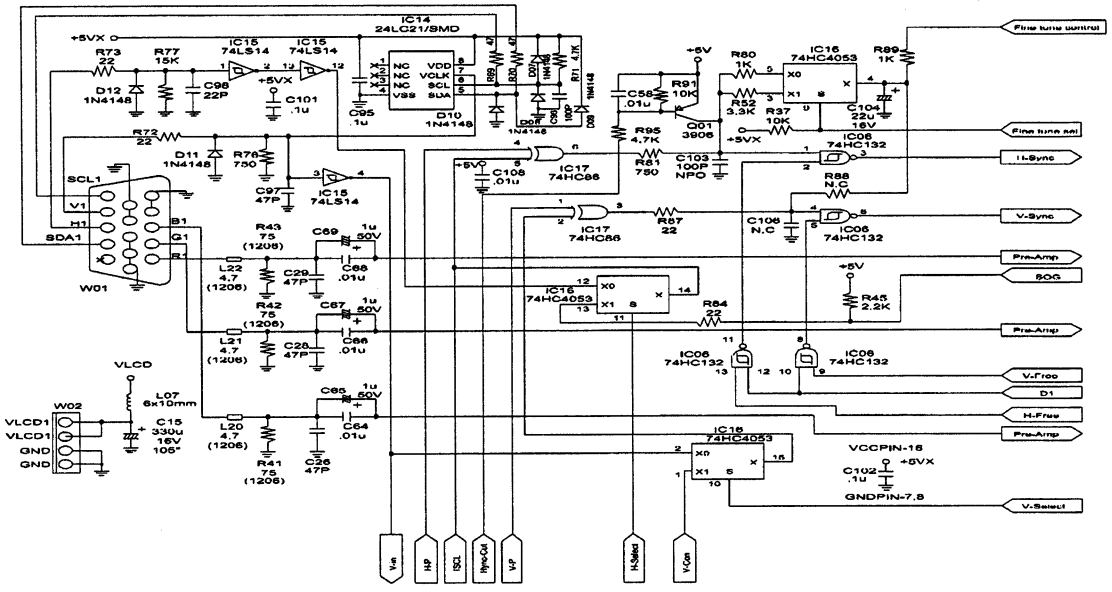
THEORY OF CIRCUIT OPERATION



This product uses 74HC4053 as a signal switch in order to support Composite SYNC and SYNC on Green timings. The MPU (IC25) in this product provides the differentiation function to the Composite SYNC, so the SYNC processor circuit is simplified. The free run function in this product also allows user to easily know the input signal is out of product specification or interrupted. When separate SYNC is detected through the V-in and H-in, MPU will set both the H-select and V-select to low level. If composite SYNC is detected, the H-select is at low level and V-select will be at high level. If SOG is detected, both H-select and V-select are at high level.

V-com is the vertical SYNC separated from the Composite SYNC through MPU.

If the input signal is out of specification or interrupted, the free run mode will be activated. The free run SYNC comes from the pin 39 and 40 of IC02.

At this condition, the pin 1 and pin 4 of IC06 are always at high level.

With the above condition and the condition that the free run enable is at high level, the V-free and H-free will activate the free run mode.

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THEORY OF CIRCUIT OPERATION

This product supports timing from VGA to XGA, so the pixel rate is from 25 MHz to 80 MHz. In order to match the phases of sampling clock and video precisely when using the fine tune function, the phase delay effect in the high pixel rate is smaller than that in the low pixel rate. The MPU will choose the proper phase adjustment circuit through pin 4 of IC25, fine tune select.

The fine tune control is a PWM signal. When MPU changes the control register value of the ASIC by I^2C bus, the duty cycle of the Fine tune control Pin will be changed. The changeable duty cycle signal will become DC level through R89 and C104. When detecting pixel rate larger than 50 MHz, the MPU will set the fine tune select to high level. If the pixel rate is smaller than 50 MHz, the fine tune select will set to low level. The R52, R59, R80 and C103 are all phase adjustment components.

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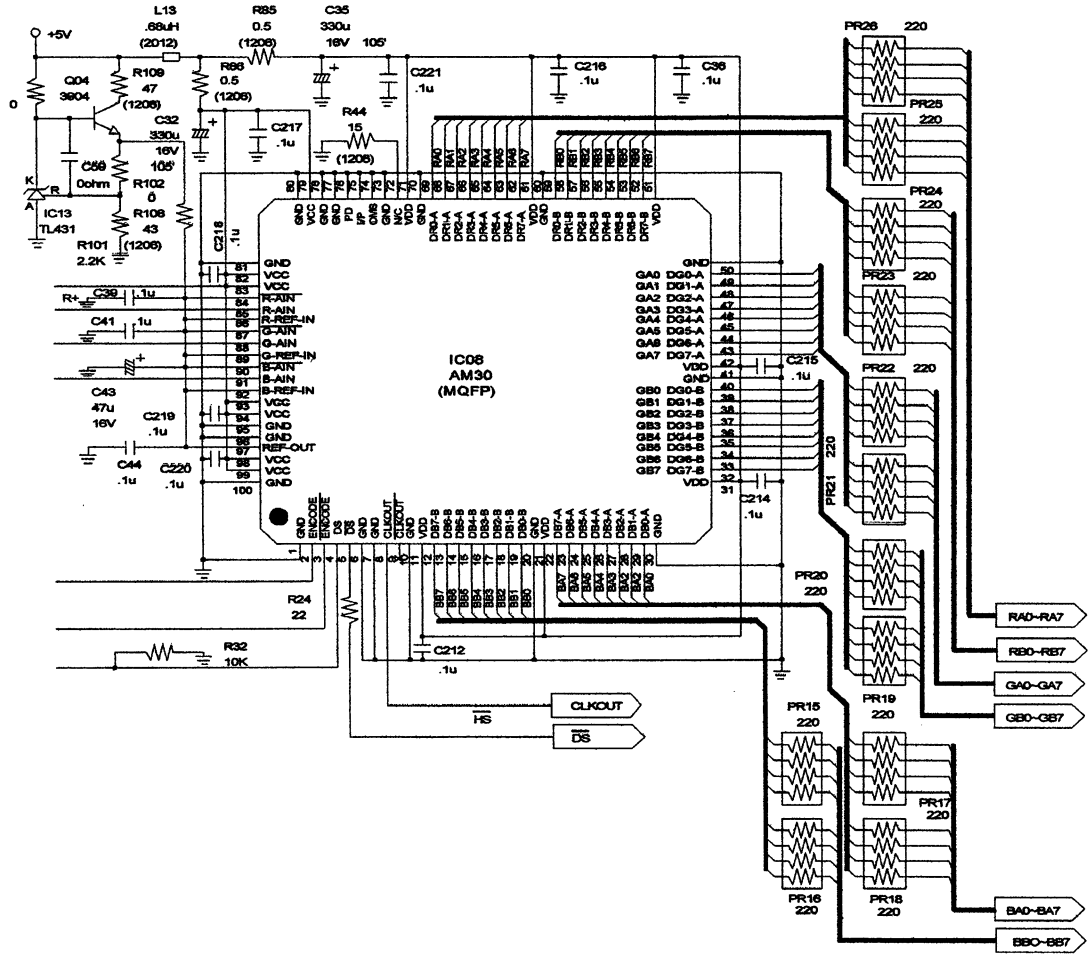
THEORY OF CIRCUIT OPERATION



AM30 is a high speed triple 8-bits A/D converter optimized for XGA LCD monitor with maximum sample rate of 96 MSPS. It can support both single-channel and dual-channel digital outputs. The analog input range of AM30 is (0.6V ~ 2.6 V). The external top reference voltage (2.6V) and bottom reference voltage (0.6V) reference voltage is required. After sampled by the six channels of A/D converter, the 48-bits of R.G.B. data fed into AM100B, which integrated analog interface XGA TFT LCD display controller.

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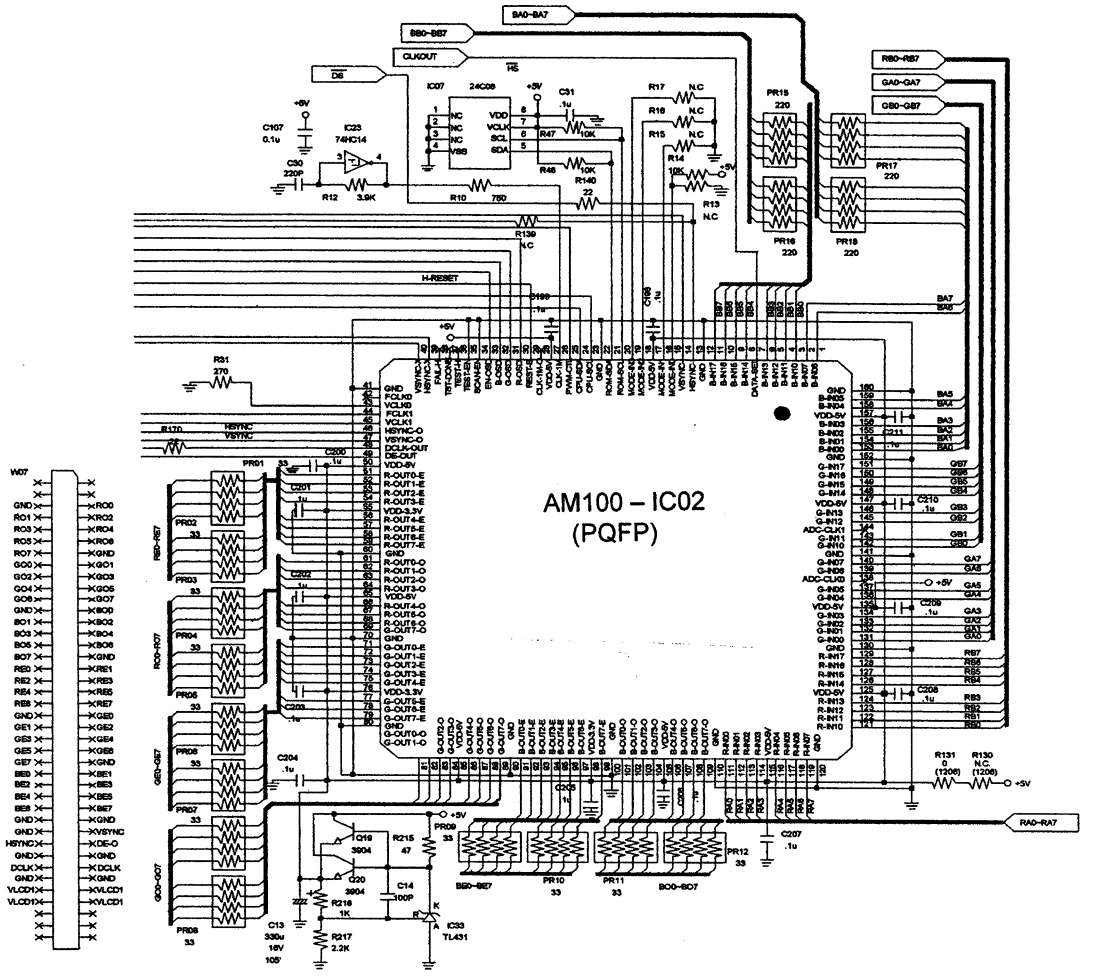
THEORY OF CIRCUIT OPERATION



AM100B

The AM100B is capable of performing automatic detection of the display resolution and timing of the input signals generated from various graphic cards. The AM100B then automatically scales the input image to fill the full screen of the LCD monitor. The AM100B can interface with TFT LCD panels from various manufacturers by generating 48-bits R.G.B. signal to the LCD panel based upon the timing parameter saved in the EEPROM (IC07).

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THEORY OF CIRCUIT OPERATION

Buffer memory and read/write control block

The AM100B uses internal buffer memory to store a portion of the input image for image scaling and output synchronization. No external memory buffer in needed for the AM100B. The write control logic ensures the input data are stored into the right area of the buffer memory, and the read control logic is responsible to fetch the data from the buffer memory from the correct area and at the correct timing sequence. With the precise timing control of the write and read logic, the output image is appropriately scaled to the full screen, and the output signal is perfectly synchronized with the input signals.

Image Scaling

The AM100B supports several different input modes, and the input image may have different sizes. It is essential to support automatic image scaling so that the input image is always displayed to the full screen regardless of the input mode. The AM100B scales the images in both horizontal and vertical directions. It calculates the correct scaling ratio for both directions based upon the LCD panel resolution, and the input mode and timing information produced by the input mode detection & auto calibration function. The scaling ratio is re-adjusted whenever a different input mode is detected. The ratio is then fed to the buffer memory read control logic to fetch the image data with the right sequence and timing. Some of the image data may be read more than once to achieve scaling effect.

Image Interpolation

The AM100B supports image interpolation to achieve better image quality. A basic image scaling algorithm replicates the input images to achieve the scaling effect. The replication scheme usually results in a poor image quality. The AM100B implements both bi-linear interpolation and a proprietary programmable interpolation algorithm. The programmable interpolation is implemented with a 256-entry mapping table in the EEPROM to allow system user to adjust the bi-linear interpolation parameters to control the sharpness and smoothness quality of the image. In the default setting, the mapping table contains s straight line of slope equal to 1, i.e. the data in entry N equal to the value N. if the mapping table contains a line of slope equal to 2, then the output image will be a bit sharper than image generated by a table with the default setting.

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THEORY OF CIRCUIT OPERATION

Dithering

The AM100B supports 16.7 million true colors for 6-bit panel. Two dithering algorithms are implemented and again users can chose between them through the external micro-controller. The first one is area-based dithering, and the second one is a frame-based frame modulation, or called frame rate control. Through external micro-controller, users can choose among different dithering algorithm.

OSD mixer and LCD interface

At the output stage, the AM100B performs the OSD mixer function, and then generates 24-bit / 48 bit RGB signal to the LCD panel with the correct timing.

OSD mixer

In the OSD mixer block, the AM100B mixes the normal output RGB signal with the OSD signal. The OSD output data is generated based on the R_OSD G_OSD and B_OSD pins as well as the OSD Intensity data in EEPROM entry. When the EN_OSD is active high, the OSD is active, and the AM100B will send the OSD data to the LCD panel. The OSD has 16 different color schemes based on the combinations of the three OSD color pins and the OSD Intensity data. When R_OSD=1, OSD_Intensity=0, the AM100B will output 128 to the output red channel, R_OUT. When R_OSD=1, and OSD Intensity=1, the AM100B will output 255. The same scheme is used for G-OSD to G-OUT and for B-OSD to B_OUT.

EEPROM interface

As mentioned in previous sections, the external EEPROM stores much crucial information for the AM100B internal operations. The AM100B interfaces with the EEPROM through a 2-wire I^2C serial interface. The suggested EEPROM device is an industry standard serial-interface EEPROM (24x08). The I^2C interface scheme is briefly described here and detail description can be found in many public literatures.

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THEORY OF CIRCUIT OPERATION

Input Mode Dependent Data

Symbol	W	640 x 350	640 x 400	720 x 400	640 x 480	800 x 600	832 X 624	1024 x 768	Description
VPW	11	00H 01H	20H 21H	40H 41H	60H 61H	80H 81H	AOH A1H	C0H C1H	LCD VSYNC pules width
VBP	11	02H 03H	22H 23H	42H 43H	62H 63H	82H 83H	A2H A3H	C2H C3H	LCD VSYNC back porch (including VPW)
VBP source	11	04H 05H	24H 25H	44H 45H	64H 65H	84H 85H	A4H A5H	C4H C5H	LCD VSYNC back porch (source equivalent) =VBP * Line Expansion and round up
Target Skip Pixel	11	06H 07H	26H 27H	46H 47H	66H 67H	86H 87H	A6H A7H	C6H C7H	If VBP can not be converted into source evenly, the leftover is converted into number of pixels
VSIZE	11	08H 09H	28H 29H	48H 49H	68H 69H	88H 89H	A8H A9H	C8H C9H	LCD number of line
HPW	11	0AH 0BH	2AH 2BH	4AH 4BH	6AH 6BH	8AH 8BH	AAH ABH	CAH CBH	LCD HSYNC pules width
HBP	11	0CH 0DH	2CH 2DH	4CH 4DH	6CH 6DH	8CH 8DH	ACH ADH	CCH CDH	LCD HSYNC back porch (including HPW)
HSIZE	11	0EH 0FH	2EH 2FH	4EH 4FH	6EH 6FH	8EH 8FH	AEH AFH	CEH CFH	LCD number of columns
HTOTAL	11	10H 11H	30H 31H	50H 51H	70H 71H	90H 91H	B0H B1H	D0H D1H	LCD total number of pixels per line including all porches
HTOTAL Source	12	12H 13H	32H 33H	52H 53H	72H 73H	92H 93H	B2H B3H	D2H D3H	LCD total number of clocks per line (source equivalent) = HTOTAL/Line Expansion
Line Expansion	4	14H [6:3]	34H	54H	74H	94H	B4H	D4H	Vertical source to destination scaling factor 0 : one to one expansion (no expansion) 1-15 : expansion ratio other than one to one (expansion)
Pixel Expansion	3	14H [2:0]	34H	54H	74H	94H	B4H	D4H	Horizontal source to destination scaling factor 0 : one to one expansion (no expansion) 1-7 : expansion ratio other than one to one (expansion)

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THEORY OF CIRCUIT OPERATION

Symbol	W	640 x 350	640 x 400	720 X 400	640 x 480	800 x 600	832 x 624	1024 X 768	Description
H. Fog Factor	8	15H [7:0]	35H	55H	75H	95H	B5H	D5H	Horizontal fogging factor high byte
H. Fog Factor	8	16H [7:0]	36H	56H	76H	96H	B6H	D6H	Horizontal fogging factor low byte
V. Fog Factor	8	17H [7:0]	37H	57H	77H	97H	B7H	D7H	Vertical fogging factor high byte
V. Fog Factor	8	18H [7:0]	38H	58H	78H	98H	B8H	D8H	Vertical fogging factor low byte
Minimum Input lines [10:8]	3	19H [6:4]	39H	59H	79H	99H	B9H	D9H	Upper 3 bits of minimum input lines
Maximum Input pixels [10:8]	3	19H [2:0]	39H	59H	79H	99H	B9H	D9H	Upper 3 bits of maximum input pixels
Minimum Input lines [7:0]	8	1AH	3AH	5AH	7AH	9AH	BAH	DAH	Minimum input lines = (VSIZE + VBP) * Line Expansion. When the input has fewer Lines than this value, it is considered as an ERROR, and INPUT_X status bit will be HIGH.
Maximum Input pixels [7:0]	8	1BH	3BH	5BH	7BH	9BH	BBH	DBH	Maximum input pixels per line. Auto clock recovery will not set input PLL divisor larger than this value.
Source HSIZE [10:8]	3	1CH [6:4]	3CH	5CH	7CH	9CH	BCH	DCH	Source horizontal size upper 3 bits
Source VSIZE [10:8]	3	1CH [2:0]	3CH	5CH	7CH	9CH	BCH	DCH	Source vertical size upper 3 bits
Source HSIZE [7:0]	8	1DH	3DH	5DH	7DH	9DH	BDH	DDH	Source horizontal size lower 8 bits
Source VSIZE [7:0]	8	1EH	3EH	5EH	7EH	9EH	BEH	DEH	Source vertical size lower 8 bits
Check sum	8	1FH	3FH	5FH	7FH	9FH	BFH	DFH	Sum of above 31 bytes (keep lower 8 bits only)

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THEORY OF CIRCUIT OPERATION

Input Mode Detection Data

Symbol	Width (bits)	Address	Description
Data low threshold	8	1C0H	Low water mark for valid data If the data is smaller than this threshold, it is considered LOW internally
Data high threshold	8	1C1H	High water mark for valid data If data is larger than this threshold, it is considered HIGH internally
Edge threshold	8	1C2H	Minimum difference between the data value of two adjacent pixels to be considered as an edge
Calibration mode	2	1C3H [1:0]	This is to select different operation modes of internal phase calibration. The selection criterion is as follow: 0:when input video signal has large overshot, it results in longest calibration time 1:when input video signal has median overshot, it results in long calibration time 2:when input video signal has normal overshot, it results in normal calibration time (recommended) 3:when input video signal has no overshot, it results in shortest calibration time
Mode 640 x 350 Sync Polarity	2	1C4H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res0 threshold [10:8]	3	1C4H [2:0]	Upper bound of the line number for 640x350 mode
Res0 threshold [7:0]	8	1C5H	Upper bound of the line number for 640x350 mode, and lower bound for 640x400
Mode 640 x 400 Sync Polarity	2	1C6H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res1 threshold [10:8]	3	1C6H [2:0]	Upper bound of the line number for 640x400 mode
Res1 threshold [7:0]	8	1C7H	Upper bound of the line number for 640x400 mode, and lower bound for 720x400
Mode 720 x 400 Sync Polarity	2	1C8H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res2 threshold [10:8]	3	1C8H [2:0]	Upper bound of the line number for 720x400 mode
Res2 threshold [7:0]	8	1C9H	Upper bound of the line number for 720x400 mode, and lower bound for 640x480

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THEORY OF CIRCUIT OPERATION

Input Mode Detection Data

Symbol	Width (bits)	Address	Description
Mode 640x480 Sync Polarity	2	1CAH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res3 threshold	3	1CAH [2:0]	Upper bound of the line number for 640x480 mode
Res3 threshold	8	1CBH	Upper bound of the line number for 640x480 mode, and lower bound for 800x600
Mode 800x600 Sync Polarity	2	1CCH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res4 threshold [10:8]	3	1CCH [2:0]	Upper bound of the line number for 800x600 mode
Res4 threshold [7:0]	8	1CDH	Upper bound of the line number for 800x600 mode, and lower bound for 832x624
Mode 832x624 Sync Polarity	2	1CEH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res5 threshold [10:8]	3	1CEH [2:0]	Upper bound of the line number for 832x624 mode
Res5 threshold [7:0]	8	1CFH	Upper bound of the line number for 832x624 mode, and lower bound for 1024x768
Mode 1024x768 Sync Polarity	2	1D0H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Res6 threshold [10:8]	3	1D0H [2:0]	Upper bound of the line number for 1024x768 mode
Res6 threshold [7:0]	8	1D1H	Upper bound of the line number for 1024x768 mode
Reserve mode 1 Sync Polarity	2	1D2H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 1 Res threshold [10:8]	3	1D2H [2:0]	Resolution threshold for reserve mode 1
Reserve mode 1 Res threshold [7:0]	8	1D3H	Resolution threshold for reserve mode 1
Reserve mode 2 Sync Polarity	2	1D4H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 2 Res threshold [10:8]	3	1D4H [2:0]	Resolution threshold for reserve mode 2
Reserve mode 2 Res threshold [7:0]	8	1D5H	Resolution threshold for reserve mode 2

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Symbol	Width (bits)	Address	Description
Reserve mode 3 Sync Polarity	2	1D6H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 3 Res threshold [10:8]	3	1D6H [2:0]	Resolution threshold for reserve mode 3
Reserve mode 3 Res threshold [7:0]	8	1D7H	Resolution threshold for reserve mode 3
Reserve mode 4 Sync Polarity	2	1D8H [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 4 Res threshold [10:8]	3	1D8H [2:0]	Resolution threshold for reserve mode 4
Reserve mode 4 Res threshold [7:0]	8	1D9H	Resolution threshold for reserve mode 4
Reserve mode 5 Sync Polarity	2	1DAH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 5 Res threshold [10:8]	3	1DAH [2:0]	Resolution threshold for reserve mode 5
Reserve mode 5 Res threshold [7:0]	8	1DBH	Resolution threshold for reserve mode 5
Reserve mode 6 Sync Polarity	2	1DCH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 6 Res threshold [10:8]	3	1DCH [2:0]	Resolution threshold for reserve mode 6
Reserve mode 6 Res threshold [7:0]	8	1DDH	Resolution threshold for reserve mode 6
Reserve mode 7 Sync Polarity	2	1DEH [5:4]	The polarity of input synchronization signals Bit 0 is for VSYNC and bit 1 is for HSYNC
Reserve mode 7 Res threshold [10:8]	3	1DEH [2:0]	Resolution threshold for reserve mode 7
Reserve mode 7 Res threshold [7:0]	8	1DFH	Resolution threshold for reserve mode 7
Enable SYNC Check	14	1E0H-1E1H	Enable SYNC polarity check during input mode Detection. 1:enable SYNC polarity based mode detection 0:disable SYNC polarity based mode detection bit 0:640x350 bit 1:640x400 bit 2:720x400 bit 3:640x480 bit 4:800x600 bit 5:832x624 bit 6:1024x768 bit 7: res mode1 bit 8: res mode2 bit 9: res mode3 bit 10: res mode4 bit 11: res mode5 bit 12: res mode6 bit 13: res mode7

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Symbol	Width (bits)	Address	Description
Maximum VBP	8	1E2H	The maximum vertical back porch for input video
PWM unit delay	13	1E3H-1E4H	The unit delay used in the external PWM delay circuitry. If the free-running clock is 1MHz and the intended unit delay is 0.2 ns (=5,000MHz) then a value of 5,000MHz/1MHz = 5,000 is used here.
Maximum link off time	22	1E5H-1E7H	Maximum time when input VSYNC is off before the LINK_DWN pin turns ON (unit: clock period of the free running clock). If the free-running clock is 1MHz, and the intended maximum time is 1 second, then a value of 1,000,000 us / 1 us = 1,000,000 is used here.
Maximum refresh rate	16	1E8H-1E9H	Maximum refresh rate supported by the LCD panel. If the intended maximum refresh rate is 75Hz, and the free-running clock is 1MHz, there a value of 1000000/75=133,333 is used here
Maximum input frequency	8	1EAH	Maximum source clock rate supported by the AM100B (unit: frequency of free-running clock) If the intended maximum clock rate is 60MHz, and the free-running clock is 1MHz, then a value of 60 is used here. If the input signal has a higher frequency than this value, the VCLK00_X status bit will turn ON.
Scale factor CE	8	1EBH	Scale factor used when generate look up table for current even pixel multiplication
Scale factor CO	8	1ECH	Scale factor used when generate look up table for current odd pixel multiplication
Scale factor NE	8	1EDH	Scale factor used when generate look up table for next even pixel multiplication
Scale factor NO	8	1EEH	Scale factor used when generate look up table for next odd pixel multiplication
Offset factor CE	8	1EFH	Offset factor used when generator look up table for current even pixel multiplication
Offset factor CO	8	1F0H	Offset factor used when generator look up table for current odd pixel multiplication
Offset factor NE	8	1F1H	Offset factor used when generate look up table for next even pixel multiplication
Offset factor NO	8	1F2H	Offset factor used when generate look up table for next odd pixel multiplication
Scale factor V	8	1F3H	Scale factor used when generate look up table for line multiplication
Offset factor V	8	1F4H	Offset factor used when generate look up table for line multiplication
Minimum pixels per line for LCD	11	1F5H-1F6H	Minimum number of pixels per line for LCD panel

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THEORY OF CIRCUIT OPERATION

Symbol	Width (bits)	Address	Description
LCD polarity	4	1F7H[3:0]	Controls the polarity of output VSYNV, HSYNC, clock and display enable Bit 0:0: clock active high, 1: clock active low Bit 1: 0: HSYNC active low, 1: HSYNC active high Bit 2: 0: VSYNC active low, 1: VSYNC active high Bit 3: 0: de active high, 1: de active low
Output enable for output pin 51-54, 56-59, 61-64, 66-69, 71-74, 76-79, 81-84, 86-89, 91-97, 99, 101-104, 106-109	1	1F8H[3]	Enable for programmable output pad 1 : output is enabled 0 : output is tri-state
Driving capability control for output pin 51-54, 56-59, 61-64, 66-69, 71-74, 76-79, 81-84, 86-89, 91-97, 99, 101-104, 106-109	3	1F8H[2:0]	0 : 2mA 1 : 6mA 2 : 6mA 3 : 10mA 4 : 4mA 5 : 8mA 6 : 8mA 7 : 12mA
Output enable for output pin 49 (DE)	1	1F9H[7]	Enable for programmable output pad 1 : output is enabled 0 : output is tri-state
Driving capability control for output pin 49 (DE)	3	1F9H[6:4]	0 : 2mA 1 : 6mA 2 : 6mA 3 : 10mA 4 : 4mA 5 : 8mA 6 : 8mA 7 : 12mA
Output enable for output pin 46 (HSYNC_O)	1	1F9H[3]	Enable for programmable output pad 1 : output is enabled 0 : output is tri-state
Driving capability control for output pin 46 (HSYNC_O)	3	1F9H[2:0]	0 : 2mA 1 : 6mA 2 : 6mA 3 : 10mA 4 : 4mA 5 : 8mA 6 : 8mA 7 : 12mA

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THEORY OF CIRCUIT OPERATION

Symbol	Width (bits)	Address	Description
Output enable for output pin 47 (VSYNC_O)	1	1FAH[7]	Enable for programmable output pad 1 : output is enabled 0 : output is tri-state
Driving capability control for output pin 47 (VSYNC_O)	3	1FAH[6:4]	0 : 2mA 1 : 6mA 2 : 6mA 3 : 10mA 4 : 4mA 5 : 8mA 6 : 8mA 7 : 12mA
Output enable for output pin 48 (DCLK_OUT)	1	1FAH[3]	Enable for programmable output pad 1 : output is enabled 0 : output is tri-state
Driving capability control for output pin 48 (DCLK_OUT)	3	1FAH[2:0]	0 : 2mA 1 : 6mA 2 : 6mA 3 : 10mA 4 : 4mA 5 : 8mA 6 : 8mA 7 : 12mA
Check sum	8	1FBH	Sum of all part 9 bytes (keep only lower 8 bit)

Horizontal Interpolation Lookup Table

Symbol	Width(bits)	Address	Description
Mapped value	8	IFEH-2FDH	This is the base table for all four horizontal interpolation lookup tables. Each table is then generated by multiply this value with corresponding scale factor and added with corresponding offset factor.
Check sum	8	2FEH	Sum of all part 10 entry (only keep lower 8 bits)

Vertical Interpolation Lookup Table

Symbol	Width(bits)	Address	Description
Mapped value	8	2FEH-3FEH	This is the base table for vertical interpolation lookup table. The vertical interpolation table is then generated by multiply this value with vertical scale factor and added with vertical offset factor
Check sum	8	3FFH	Sum of all part 10 entry (only keep lower 8 bits)

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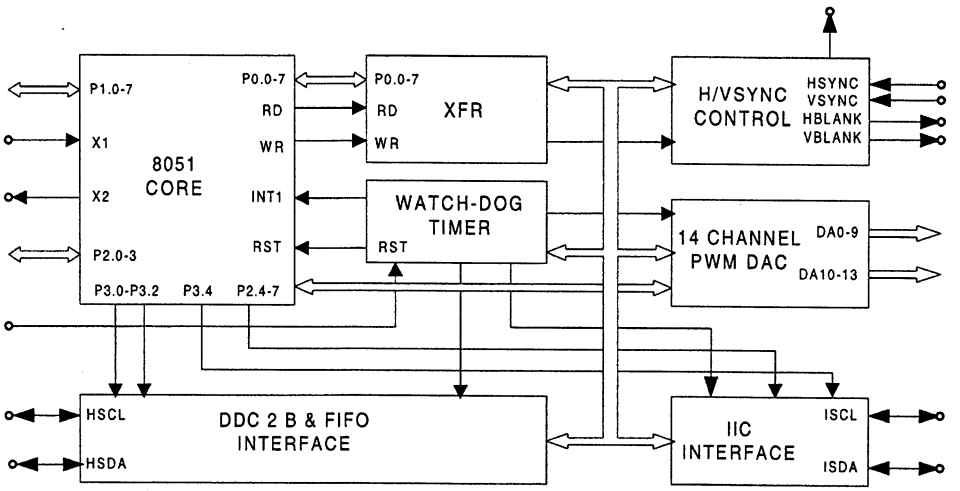
THEORY OF CIRCUIT OPERATION

The AM100B support 2-wire I^2C serial interface to external CPU. The interface allows external CPU to access and modify control registers inside the AM100B. The I^2C serial interface is similar to the EEPROM interface, and the CPU is the host that drives the SCL all the clock and for start and stop bits. The SCL frequency can be as high as 5MHz. The SDA is a bi-directional data wire. This interface support random and sequential write operations for CPU to modify one or multiple control registers, and random and sequential read operations for CPU to read all or part of the control registers.

The MTV112E micro controller is an 8051CPU core embedded device specially tailored to monitor applications. It includes an 8051 CPU core, 256 bytes SRAM, fourteen built-in PWM DACs, DDC2B interface, 24Cxx series EEPROM interface, A/D converter and a 32K bytes internal program EPROM.



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THEORY OF CIRCUIT OPERATION

FUNCTIONAL DESCRIPTIONS

8051 CPU Core

1. The MTV112E includes all the 8051 functions with the following exceptions, PSEN, ALE, RD and WR pins are disabled. The external RAM access is restricted to XFRs within the MTV112E.
2. Port0, port3.3, and port3.5 ~ port3.7 are not general-purpose I/O ports. They are dedicated to monitor control or DAC pins.
3. INT1 and T1 input pins are not provided.
4. Port2.4 ~ port2.7 are shared with DAC pins; port3.0 ~ port3.2 port3.4 are shared with monitor control pins.

In addition, there are 2 timers, 5 interrupt sources and serial interface compatible with the standard 8051. The Txd/Rxd (P3./P3.1) pins are shared with DDC interface. INT0/T0 pins are shared with I^2C interface. An extra option can be used to switch the INT0 source from P3.2 to P2.0. This feature maintains an external interrupt source when I^2C interface

The MTV112E pin functions of AX150T-2 are listed below:

PIN#	Name	TYPE	Description
1	P1.0	I/O	SDA of I^2C for communication with ICS1523
2	P1.1	O	SCL of I^2C for communication with ICS1523
3	P1.2	O	Power switch of +5V and VLCD
4	P1.3	O	Fine tune function select
5	P1.4	O	H-Sync polarity
6	P1.5	O	V-Sync polarity
7	P1.6/ADD	O	Inverter enable
8	P1.7/AD1	O	AM100B Rest signal
9	RST	I	MPU Rest signal
10	HSCL	N.C.	SDA of I^2C for DDC
11	HSDA	N.C.	SCL of I^2C for DDC
12	ISDA	I/O	SDA of I^2C for communication with 24C08, MTV118, M52473

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PIN#	Name	TYPE	Description
13	HSYNC	I	H-Sync input
14	ISCL	O	SCL of I^2C for communication with 24C08, MTV118, M52473
15	VSYNC	I	V-Sync input
16	HBK/P4.1	N.C.	
17	VBK/P4.0	O	Separated V-Sync signal from composite sync
18	X2	O	Oscillator output
19	X1	I	Oscillator input
20	VSS	-	Negative Power Supply (GND)
21	P2.0/INT0	-	Reserve
22	P2.1	I/O	SDA of I^2C for communication with AM100B
23	P2.2	I/O	SCL of I^2C for communication with AM100B
24	P2.3	-	Reserve
25	D13/P2.4	I	'+" key
26	D12/P2.5	I	"Menu" key
27	D11/p2.6	I	'-" key
28	D10/P2.7	I	"Auto" key
29	STOUT/P4.2	-	N.C.
30	D9	O	LED 2
31	D8	O	LED 1
32	D7	O	Video gain control
33	D6	-	Reserve
34	D5	O	External H-Sync cutoff control
35	D4	O	Video offset control
36	D3	O	Sync on green /separate or composite select
37	D2	O	V-Sync select (VBK/external V-Sync)
38	D1	O	Free run mode enable
39	D0	O	Brightness control voltage
40	VDD	-	Positive Power Supply

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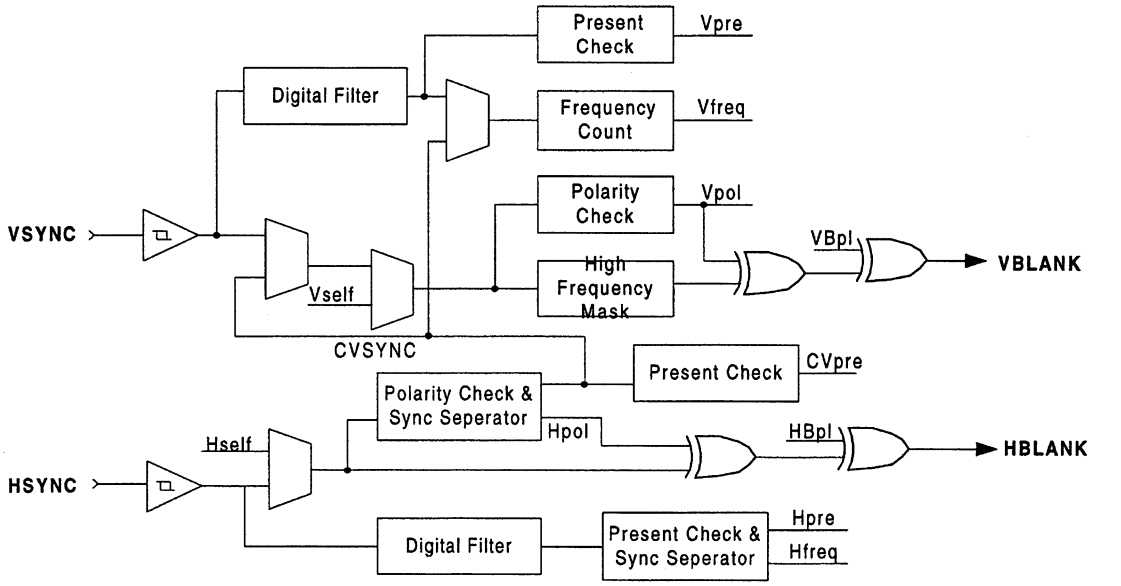
H/V SYNC Processing



The SYNC processing block performs the functions of composite signal separation, sync inputs presence check, frequency counting, polarity detection and control, as well as protection of VBLANK output while VSYNC speed up in high DDC communication clock rate. The preset and frequency function block treat any pulse shorter than one OSC period as noise.

Composite sync separate

The MTV112E continuously monitors the input HSYNC, if the vertical sync pulse can be extracted from the input, a CVpre flag is set and user can select the extracted "CVSYNC" for the source of polarity check, frequency count, and VBLANK. The CVSYNC will have 10-16 us delay compared to the original signal. The delay depends on the OSC frequency and composite mix method.

H/V Polarity Detect

The polarity functions detect the input HSYNC/VSYNC high and low pulse duty cycle. If the high pulse duration is longer than that of low pulse, the negative polarity is asserted; otherwise positive polarity is asserted. The HPLchg interrupt is set when the Hpol value changes. The VPLchg interrupt is set when Vpol value changes.

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THEORY OF CIRCUIT OPERATION

H/V Frequency Counter

MTV112E can discriminate HSYNC/VSYNC frequency and saves the information in XFRs. The 15 bits Hcounter counts the time of 64XHSYNC period, but only 11 upper bits are loaded into the HCNTH/HCNTL latch.
The 11 bits output value will be (2/Hfreq) / (1/OSCfreq), updated once per VSYNC/CVSYNC period when VSYNC/CVSYNC is present or continuously updated when VSYNC/CVSYNC is non-present. The 14 bits Vcounter counts the time between two VSYNC pulses, but only 9 upper bits are loaded into the VCNTH/VCNTL latch. The 9 bits output value will be (1/Vfreq) / (512/OSCfreq), updated every VSYNC/CVSYNC period. An extra overflow it indicates the condition of H/V counter overflow. The VFchg/HFchg interrupt is active when VCNT/HCNT value changes or overflow.

H/V Present Check

The Hpresent function checks the input HSYNC pulse, Hpre flag is set when HSYNC IS OVER 10KHz or cleared when HSYNC is under 10Hz. The Vpresent function checks the input VSYNC pulse, the Vpre flag is set when VSYNC is over 40Hz or cleared when VSYNC is under 10Hz. A control bit "PREFS" selects the time base for these functions. The HPRchg interrupt is set when the Hpre value changes. The VPRchg interrupt is set when the Vpre/Cvpre value change. However, the Cvpre flag interrupt may be disabled when S/W disable the composite function.

Output HBLANK/VBLANK Control and Polarity Adjust

The HBLANK is the mux output of HSYNC and self-test horizontal pattern. The VBLank is the mux output of VSYNC, CVSYNC and self-test vertical pattern. The mux selection and output polarity are S/W controllable. The VBLANK output is cut off when VSYNC frequency is over 200Hz or 133Hz depends on 8MHz/12MHz OSC selection. The HBLANK/VBLANK shares the output pin with P4.1/P4.0.

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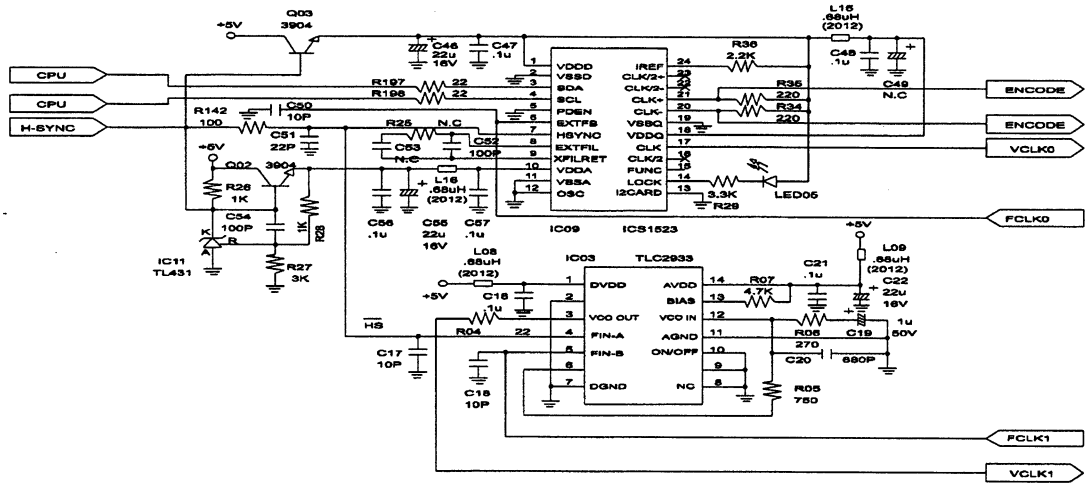
THEORY OF CIRCUIT OPERATION

PLL



The ICS1523 is a high performance frequency generator intended for line-locked and gen-locked high resolution video applications. It offers pixel clock outputs in both differential (to 250MHz) and single-ended (to 150MHz) formats. It is an effective clock solution for video projectors and displays at resolutions from VGA to beyond XGA. The advanced phase-locked loop utilizes either its internal programmable feed-backed divider or an external divider. The device is programmed by a standard I^2C – bus ^{TM} serial interface. ICS1523 adopts external feedback method to create the sampling clock to provide the A/D converter (AM30). When external divider changes the divisor, the sampling clock frequency is changed.

The TLC2933 is designed for phase-locked-loop systems and is composed of a voltage-controlled oscillator (VCO) and an edge-triggered-type phase frequency detector (PFD).

The Oscillator frequency range of VCO is set by an external bias resistor (R07). The high-speed PFD with internal charge pump detects the phase difference between the reference frequency input and signal frequency input from the external divider.

The main purpose of TLC2933 is to create the dot clock to the panel.

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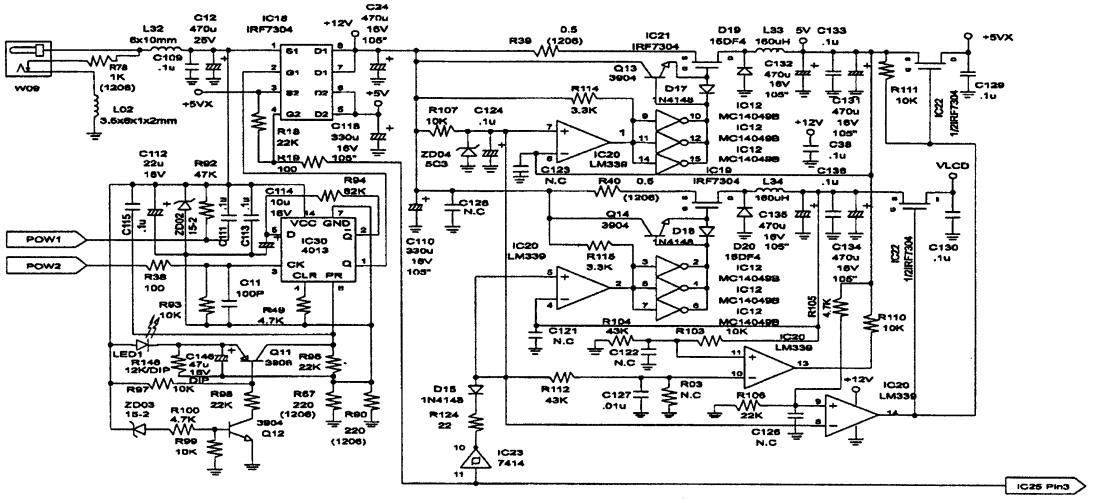
POWER SYSTEM



This product uses an external power adapter to provide the DC +12 volts.
In order to greatly reduce the power consumption when in power saving stage, the circuit in Fig. 1 is used not only to convert the 12 V to 5 V, but also to control the 5V 's ON/OFF status. IC30 (4013) is a D-Filp Flop CMOS and IC18 is a P-Channel MOSFET. When Vgs < -0.7 V, MOS turns on. As shown in the circuit, when 12 V DC currents enter W09, it creates a pulse through C115 and presets the Flip-Flop. When Q(IC30, pin 1) is in high level, the 12 V could not pass IC18 and the whole system is kept OFF status. When press the power switch, the pin3 of IC30 comes a pulse to force Q to be low level. The pin 7 & 8 is conducted and the 12 V begins supplying the system.
There are two regulators that convert the 12 V to 5 V. They are +5Vx and VLCD. The comparator of IC20 will make the output of two regulators as a feed back to compare with the reference voltage. The compared result will control the IC19 ON/OFF time to achieve the voltage regulation effects. ZD04 will provide the reference voltage. Q13, 14 and MC14049 are basically used to speed up the MOSFET ON/OFF switching time in order to reduce IC19 power consumption.
This product also equips with over-voltage protection circuit. When voltage at W09 is over 15 Volts, Q12 will turn on to make the pin 6 of IC30 always at high level and IC18 will be in off level.
The VLCD source provide all of the required power for the LCD panel. And the +5V provide most of the power for the main devices like A/D converter, PLL, ASIC and etc. When system enters the power saving stage, the above two power sources will turn off through the pin 3 of IC25. The + 5 V source provides power to the CPU and SYNC processor, so it must be isolated from other power sources.
When in power saving stage, the pin 3 of IC25 will be set to low level to make the +5 V and VLCD to be cut off.

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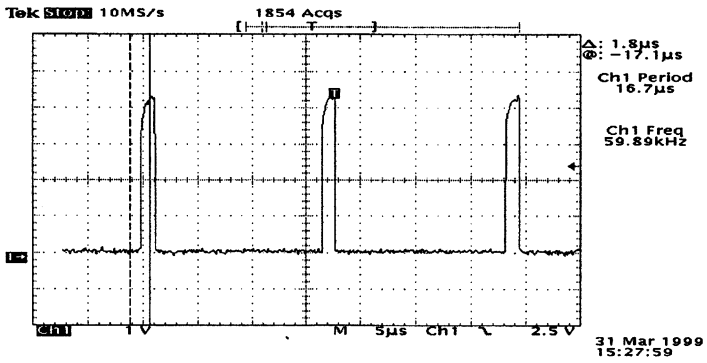
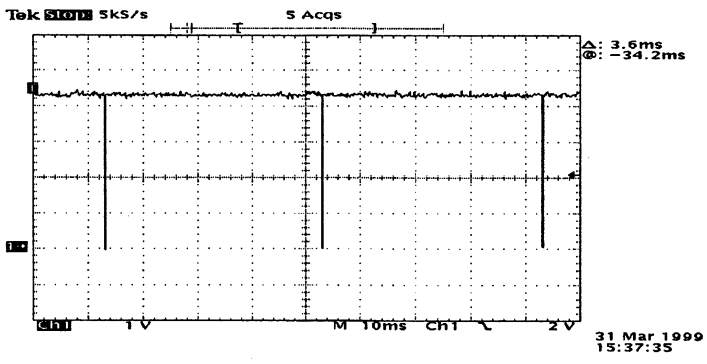
WAVEFORMS

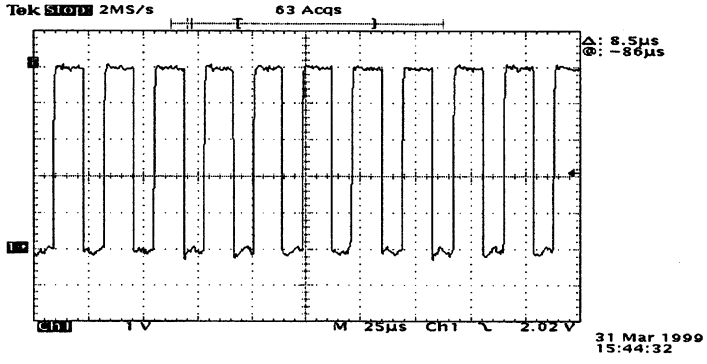
H-SYNC SIGNAL (IC25 AT PIN 13)



V-SYNC SIGNAL (IC25 AT PIN 15)



PWM BRIGHTNESS CONTROL (IC25 AT PIN 39)



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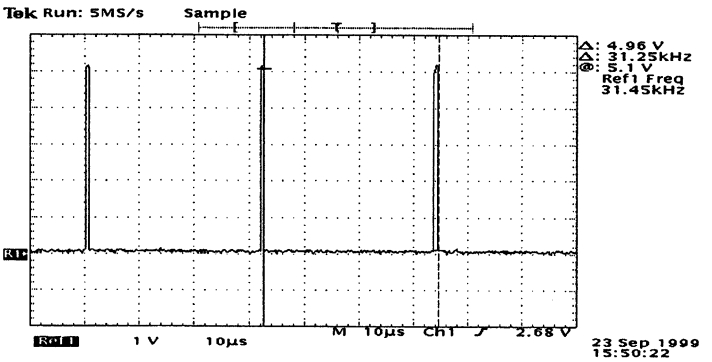
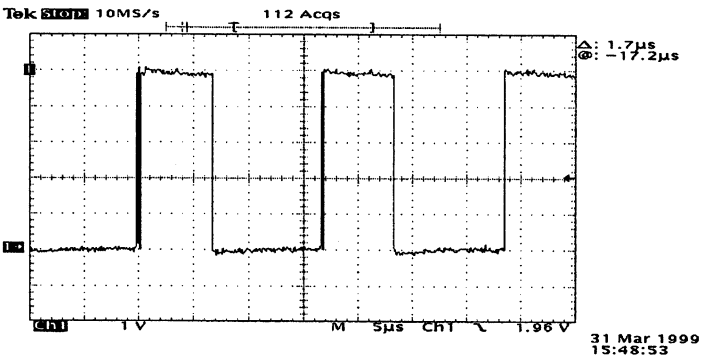
WAVEFORMS

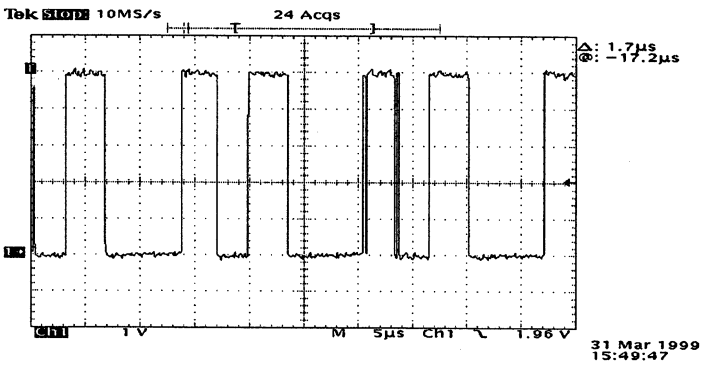
PRE-AMP CLAMP (IC31 AT PIN 19)



A/D DATA OUTPUT BIT 7 (IC08 AT PIN 52)



A/D DATA OUTPUT BIT 6 (IC08 AT PIN 53)



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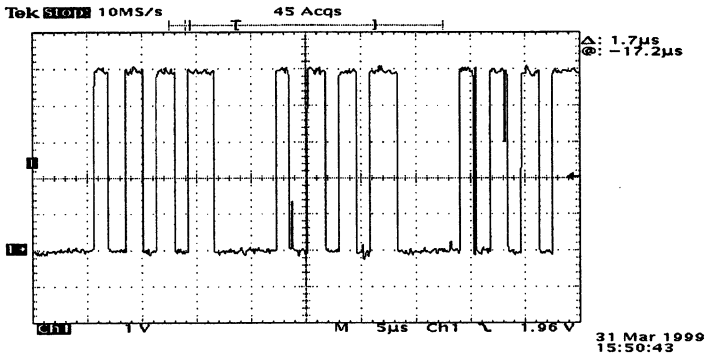
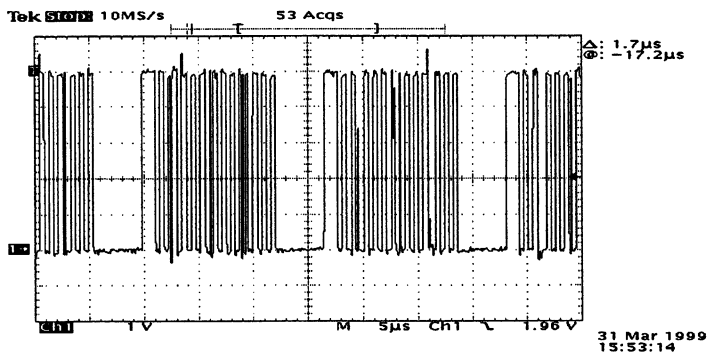
WAVEFORMS

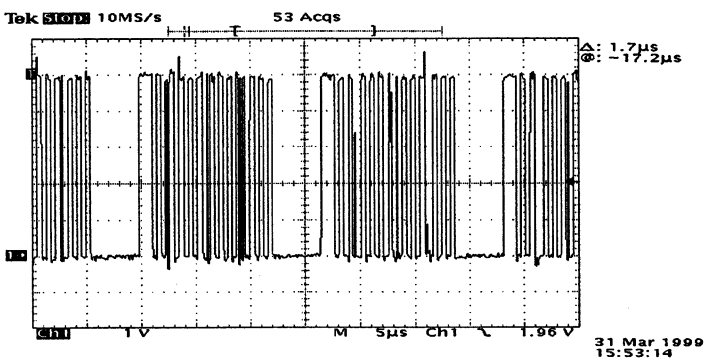
A/D DATA OUTPUT BIT 5 (IC08 AT PIN 54)



A/D DATA OUTPUT BIT 4 (IC08 AT PIN 55)



A/D DATA OUTPUT BIT 3 (IC08 AT PIN 56)



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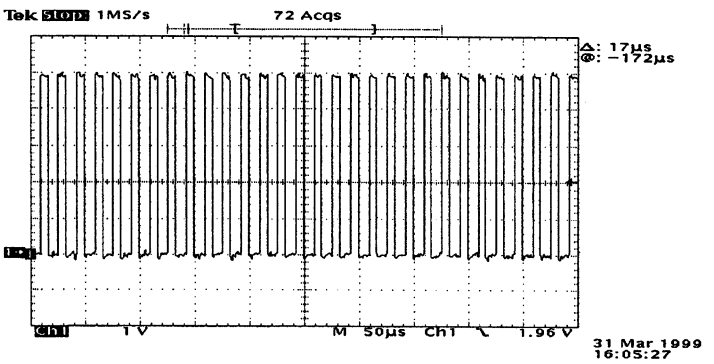
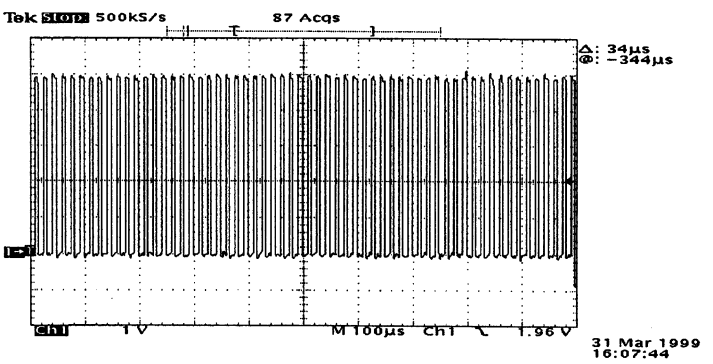
WAVEFORMS

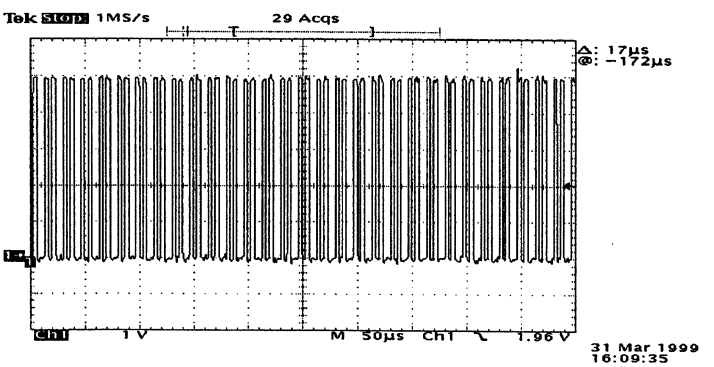
A/D DATA OUTPUT BIT 2 (IC08 AT PIN 57)



A/D DATA OUTPUT BIT 1 (IC08 AT PIN 58)



A/D DATA OUTPUT BIT 0 (IC08 AT PIN 59)



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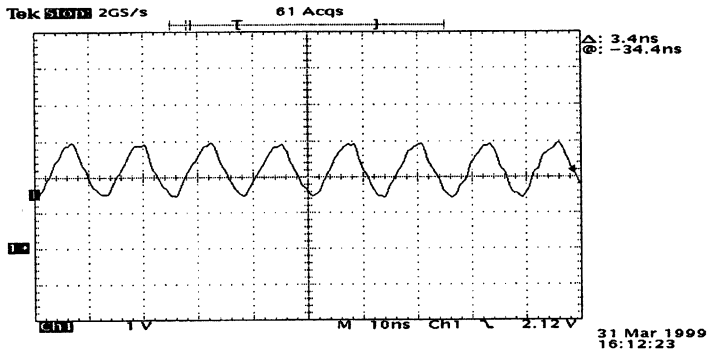
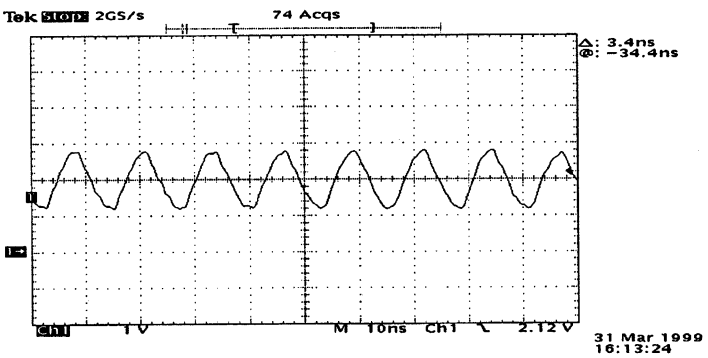
WAVEFORMS

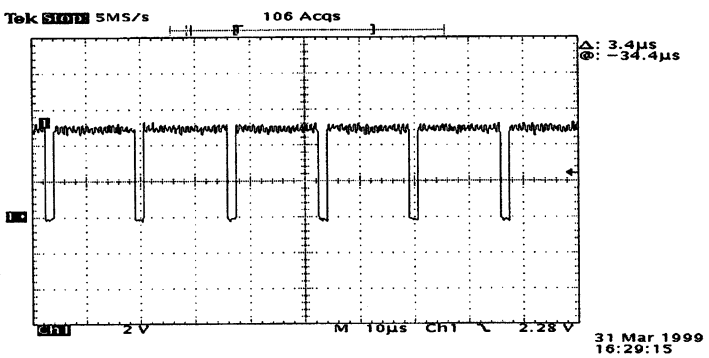
A/D SAMPLE CLOCK 1 (IC08 AT PIN 2)



A/D SAMPLE CLOCK 2 (IC08 AT PIN 3)



PLL0 FCLK 0 (IC02 AT PIN 42)



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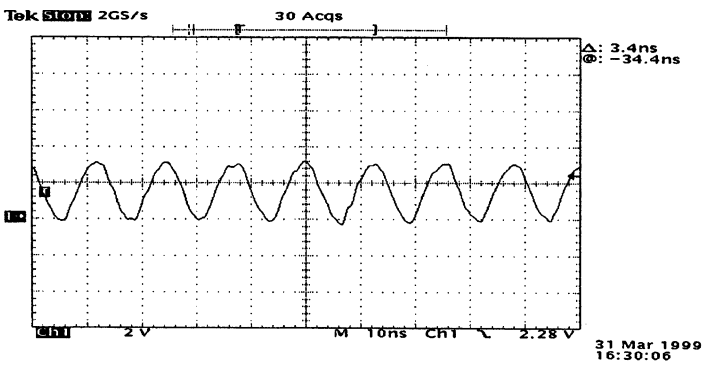
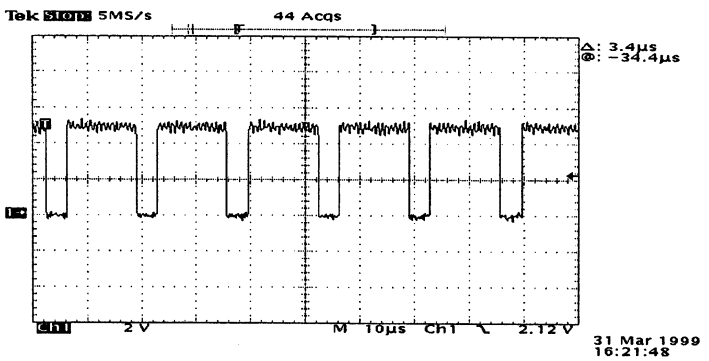
WAVEFORMS

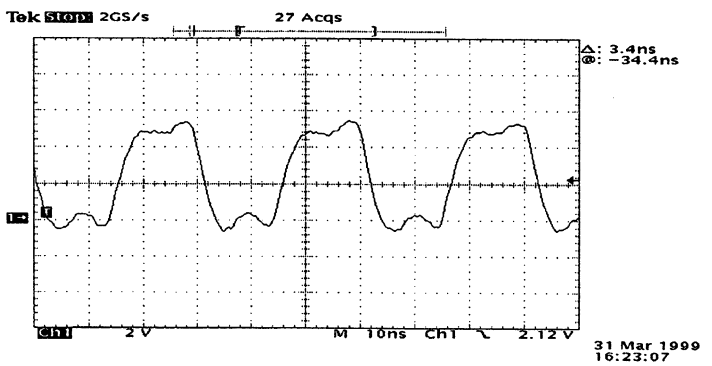
PLL0 VCLK 0 (IC02 AT PIN 43)



PLL1 FCLK 1 (IC02 AT PIN 44)



PLL1 VCLK 1 (IC02 AT PIN 45)



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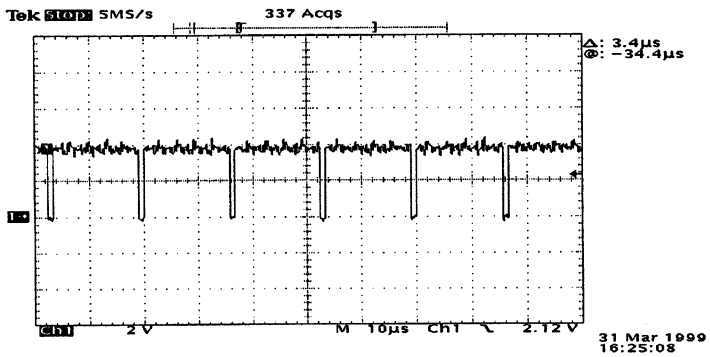
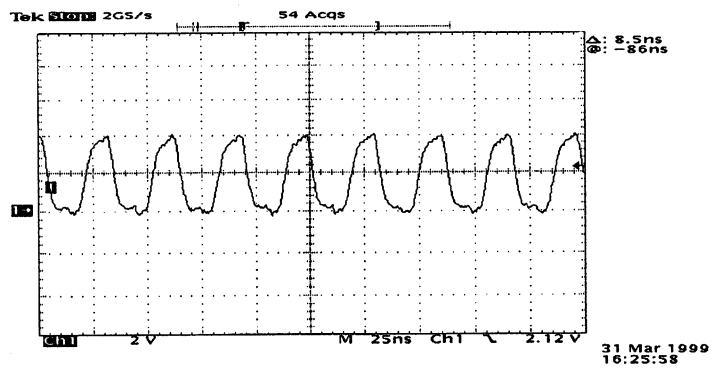
WAVEFORMS

DATA ENABLE (IC02 AT PIN 49)



OUTPUT DOT CLOCK (IC02 AT PIN 48)



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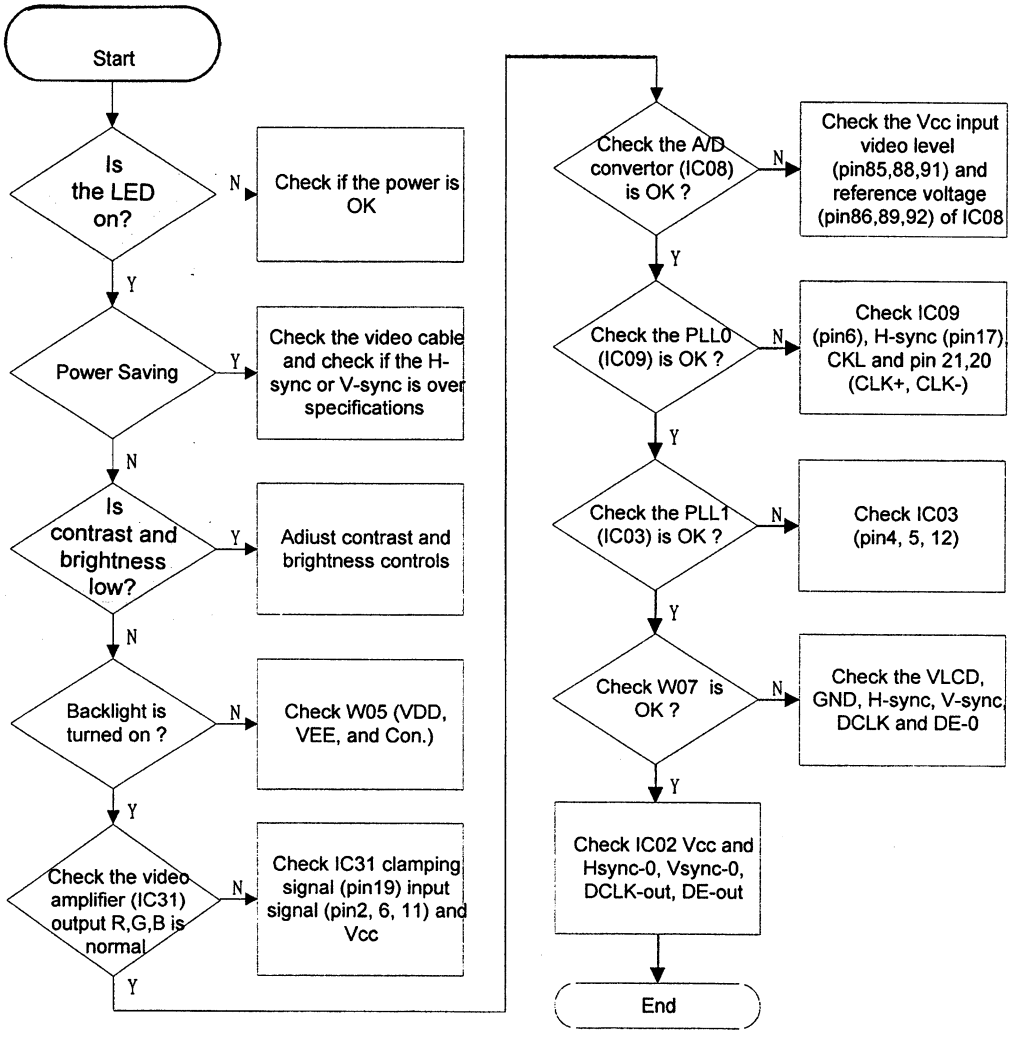
TROUBLE SHOOTING

VIDEO DOES NOT APPEAR


Start
Is the LED on?
N
Check if the power is OK
Y
Power Saving
Y
Check the video cable and check if the H-sync or V-sync is over specifications
N
Is contrast and brightness low?
Y
Adiust contrast and brightness controls
N
Backlight is turned on ?
N
Check W05 (VDD, VEE, and Con.)
Y
Check the video amplifier (IC31) output R,G,B is normal
N
Check IC31 clamping signal (pin19) input signal (pin2, 6, 11) and Vcc
Y
Check the A/D convertor (IC08) is OK ?
N
Check the Vcc input video level (pin85,88,91) and reference voltage (pin86,89,92) of IC08
Y
Check the PLL0 (IC09) is OK ?
N
Check IC09 (pin6), H-sync (pin17), CKL and pin 21,20 (CLK+, CLK-)
Y
Check the PLL1 (IC03) is OK ?
N
Check IC03 (pin4, 5, 12)
Y
Check W07 is OK ?
N
Check the VLCD, GND, H-sync, V-sync, DCLK and DE-0
Y
Check IC02 Vcc and Hsync-0, Vsync-0, DCLK-out, DE-out
End

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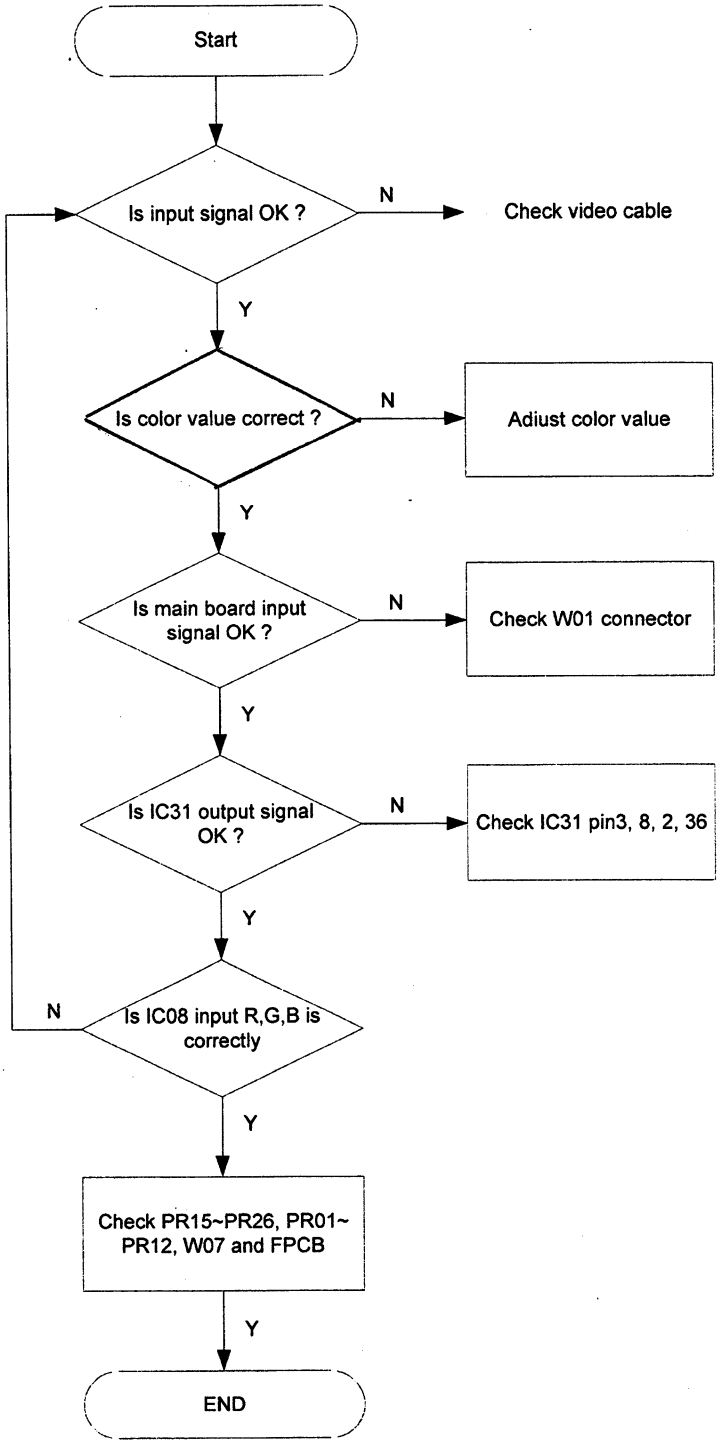
TROUBLE SHOOTING

R, G, B Is Not Displayed Correctly



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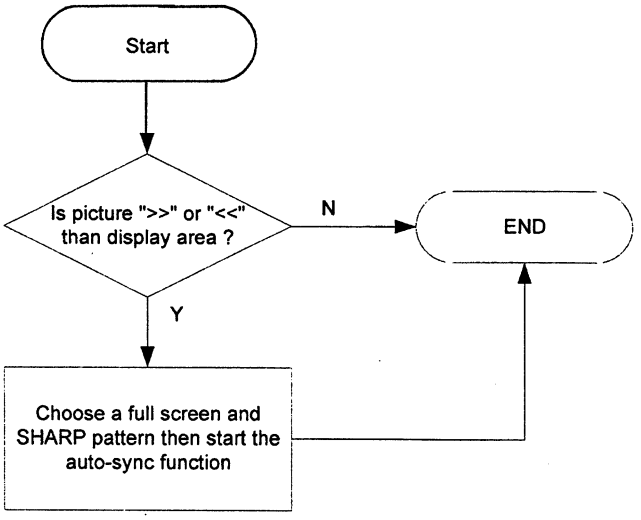
TROUBLE SHOOTING

IMPROPER RESOLUTION



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SPARE PARTS LIST

PART NO	DESCRIPTION	LOC	QTY
0130-0508-1859	RES. CF 0.5ohm 18/W J 1206	R39,R40,R85, R86	4
0130-4708-1859	RES. CF 4.7ohm 1/8W J 1206	L30, L31, R66	3
0301-8000-0801	CONN. B TO B FX8C 80P F.M. (FX8C-80S-SV)	W07	1
0300-7012-2103	AC TO DC ADAPTOR (UP06031120A)		1
0320-3400-0010	POWER CORD 6ft 220V VDE		1
0320-4400-0010	POWER CORD 6ft 110V UL/CSA AL		1
0321-0400-0060	S.CABLE 1800mm 15(3R-3R) 3+6C / PC99		1
0344-6880-0603	PEAKING COIL 0.68uH 1/4W K 2012	L13	1
0370-0000-3133	CHIP BEAD CORE 80ohm (FCM1608K-800)	L23	1
0400-0511-2000	ZENER 5C3 5.1-5.3V 1/2W	ZD04	1
0400-1451-2000	ZENER 15-2 14.5-15.1V 1/2W	ZD02, ZD03	2
0410-5000-1610	TRANSISTOR 2N3904 SMD	Q2, Q13, Q14, Q19, Q20	5
0420-1001-3601	POWER MOS IRF7304 SMD 8PIN	IC19, IC21	2
0430-1000-1004	IC MM74HC00M SMD 14PIN	IC06	1
0430-1000-5005	IC 74HC86AFN SMD 14PIN	IC17	1
0430-1000-7004	IC 74HC14 SMD 14PIN	IC23	1
0430-1003-0004	IC DM74LS14MX SMD14PIN	IC15	1
0430-4005-6028	IC ICS1523 SMD 24PIN	IC09	1
0430-4005-7839	IC AM30 SMD 100PIN (MQFP)	IC08	1
0430-6000-4307	IC TL431CZ TO-92 T	IC11, IC33	2
0430-7000-6015	IC TLC2933PWLE SMD 14PIN	IC03	1
0460-2900-0101	WH FPCB 80-8bit 134*119.35mm 1/1Z		1
0500-0101-0091	INVERTER DC-AC (TAD275-8 REV.C)		1
1701-0103-1070	Front Panel CAB. G7397 PC+ABS NOKIA 510L		1
1701-0201-4000	REAR COVER CAB.		1
1701-0502-0000	FRONT BASE CAB.		1
1701-0502-1001	BOTTOM BASE CAB.		1
1701-0502-2000	REAR BASE CAB.		1
1925-1000-0520	EPS FOAM-A		1
1925-1000-0530	EPS FOAM-B		1
1925-1200-2060	CARTON NOKIA 510L		1
1925-1300-2130	MANUAL NOKIA 510L		1
3150-0012-0156	LCD DISPLAY BD ASS'Y		1
3150-0272-0150	LCD MAIN BD ASS'Y		1

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COMPLETE PARTS LIST

MODULE NO: 2513-3316-0023 LCD MONITOR 15.0" **(Nokia 510L)**					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
1	M	315006320331	LCD PANEL ASS'Y (NOKIA 510L)	ASMO01	1
2	M	315000220334	LCD BASE ASS'Y (AX150T)	ASMO02	1
3	M	315005620312	LCD PACKING ASS'Y (NOKIA 510L)	ASMO03	1

MODULE NO: 3150-0012-0156 LCD DISPLAY BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
4	M	044050000020	LED L-59GYW 5 φ	LEDD01	1
5	M	170115000020	LED HOLDER (LEK4-4.5TB)	LED01N	1
6	M	017417400130	PCB DISPLAY BD K1 147.75*19.5*1.6T	PCB02	1
7	M	022070200381	SW TACTILE 6.2*7MM 4P 90' (TSVC-1)	SWD01	1
8	M	022070200381	SW TACTILE 6.2*7MM 4P 90' (TSVC-1)	SWD02	1
9	M	022070200381	SW TACTILE 6.2*7MM 4P 90' (TSVC-1)	SWD03	1
10	M	022070200381	SW TACTILE 6.2*7MM 4P 90' (TSVC-1)	SWD04	1
11	M	022070200381	SW TACTILE 6.2*7MM 4P 90' (TSVC-1)	SWD05	1
12	M	045120000964	WAFER 2.00MM 9P 90' KINK	WD01	1

MODULE NO: 3150-0022-0334 LCD BASE ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
13	M	170105021001	BOTTOM BASE CAB. (AX150T)	BS01	1
14	M	171201000540	BASE BRACKET (AX150T)	BS02	1
15	M	170110000010	BASE FOOT (φ 18.0*1.5T)	BS02M	4
16	M	172100031020	TAP. SCREW-TB #3.0*10.0L,NI	BS02N	1
17	M	172030041020	MAC. SCREW-MF M4.0*10.0L,NI	BS02O	2
18	M	170105020000	FRONT BASE CAB. (AX150T)	BS03	1
19	M	170105022000	REAR BASE CAB. (AX150T)	BS04	1
20	M	171201000531	SUPPORT BRACKET FOR BASE (AX150T)	BS05	1
21	M	172100031020	TAP. SCREW-TB #3.0*10.0L,NI	BS05M	2

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
22	M	010112211211	E/C GEN. 220UF 16V 105' F	C01	1
23	M	010113311211	E/C GEN. 330UF 16V 105' F	C05	1
24	M	011121505102	C/C DISK 15PF 50V NPO F-K	C06	1
25	M	011121505102	C/C DISK 15PF 50V NPO F-K	C07	1
26	M	011134705105	C/M MULTI 47PF 50V NPO 0805	C08	1
27	M	010111091504	E/C GEN. 1.0UF 50V RV2 SMD	C10	1
28	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C101	1
29	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C102	1
30	M	011131015105	C/M MULTI 100PF 50V NPO 0805	C103	1
31	M	010112291504	E/C GEN. 2.2UF 50V RV2 SMD	C104	1
32	M	011138205105	C/M MULTI 82PF 50V NPO 0805	C105	1
33	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C107	1
34	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C108	1
35	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C109	1
36	M	011131015105	C/M MULTI 100PF 50V NPO 0805	C11	1
37	M	010113311211	E/C GEN. 330UF 16V 105' F	C110	1
38	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C111	1
39	M	010112201204	E/C GEN. 22UF 16V RV2 SMD	C112	1
40	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C113	1
41	M	010111001204	E/C GEN. 10UF 16V RV2 SMD	C114	1
42	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C115	1
43	M	010113311211	E/C GEN. 330UF 16V 105' F	C118	1
44	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C119	1
45	M	010114711312	E/C GEN. 470UF 25V 105' K	C12	1
46	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C124	1
47	M	011131035115	C/M MULTI 0.01UF 50V X7R 0805	C127	1
48	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C129	1
49	M	010113311211	E/C GEN. 330UF 16V 105' F	C13	1
50	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C130	1
51	M	010114711211	E/C GEN. 470UF 16V 105' F	C131	1
52	M	010114711211	E/C GEN. 470UF 16V 105' F	C132	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
53	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C133	1
54	M	0101-1471-1211	E/C GEN. 470uF 16V 105' F	C134	1
55	M	0101-1471-1211	E/C GEN. 470uF 16V 105' F	C135	1
56	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C136	1
57	M	0101-1100-1204	E/C GEN. 10uF 16V RV2 SMD	C137	1
58	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C138	1
59	M	0101-1100-1204	E/C GEN. 10uF 16V RV2 SMD	C139	1
60	M	0111-3101-5105	C/M Multi 100PF 50V NPO 0805	C14	1
61	M	0111-3470-5105	C/M Multi 47PF 50V NPO 0805	C140	1
62	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C141	1
63	M	0111-3220-5105	C/M Multi 22PF 50V NPO 0805	C142	1
64	M	0111-3220-5105	C/M Multi 22PF 50V NPO 0805	C143	1
65	M	0101-1100-1204	E/C GEN. 10uF 16V RV2 SMD	C144	1
66	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C145	1
67	M	010114701211	E/C GEN. 47UF 16V 105' F	C146	1
68	M	0101-1331-1211	E/C GEN. 330uF 16V 105' F	C15	1
69	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C16	1
70	M	0111-3100-5105	C/M Multi 10PF 50V NPO 0805	C17	1
71	M	0111-3100-5105	C/M Multi 10PF 50V NPO 0805	C18	1
72	M	0111-3103-5115	C/M Multi 0.01uF 50V X7R 0805	C181	1
73	M	0111-3103-5115	C/M Multi 0.01uF 50V X7R 0805	C182	1
74	M	0111-3103-5115	C/M Multi 0.01uF 50V X7R 0805	C183	1
75	M	0111-3103-5115	C/M Multi 0.01uF 50V X7R 0805	C184	1
76	M	0101-1109-1504	E/C GEN. 1.0uF 50V RV2 SMD	C19	1
77	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C198	1
78	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C199	1
79	M	0111-3222-5115	C/M Multi 2200PF 50V X7R 0805	C20	1
80	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C200	1
81	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C201	1
82	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C202	1
83	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C203	1
84	M	0111-3104-5135	C/M Multi 0.1uF 50V Y5V 0805	C204	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
85	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C205	1
86	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C206	1
87	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C207	1
88	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C208	1
89	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C209	1
90	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C21	1
91	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C210	1
92	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C211	1
93	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C212	1
94	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C214	1
95	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C215	1
96	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C216	1
97	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C217	1
98	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C218	1
99	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C219	1
100	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C220	1
101	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C221	1
102	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C23	1
103	M	010114711211	E/C GEN. 470UF 16V 105' F	C24	1
104	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C25	1
105	M	011131005105	C/M MULTI 10PF 50V NPO 0805	C26	1
106	M	013015001858	RES. CF 150ohm 1/8W J 0805	C27	1
107	M	011131005105	C/M MULTI 10PF 50V NPO 0805	C28	1
108	M	011131005105	C/M MULTI 10PF 50V NPO 0805	C29	1
109	M	011132215105	C/M MULTI 220PF 50V NPO 0805	C30	1
110	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C31	1
111	M	010113311211	E/C GEN. 330UF 16V 105' F	C32	1
112	M	011131015105	C/M MULTI 100PF 50V NPO 0805	C33	1
113	M	010113311211	E/C GEN. 330UF 16V 105' F	C35	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
114	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C36	1
115	M	010114701204	E/C GEN. 47UF 16V RV2 SMD	C37	1
116	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C38	1
117	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C39	1
118	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C41	1
119	M	010114701204	E/C GEN. 47UF 16V RV2 SMD	C43	1
120	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C44	1
121	M	010112201204	E/C GEN. 22UF 16V RV2 SMD	C46	1
122	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C47	1
123	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C48	1
124	M	011134705105	C/M MULTI 47PF 50V NPO 0805	C49	1
125	M	011131005105	C/M MULTI 10PF 50V NPO 0805	C50	1
126	M	011132205105	C/M MULTI 22PF 50V NPO 0805	C51	1
127	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C52	1
128	M	011131015105	C/M MULTI 100PF 50V NPO 0805	C54	1
129	M	010112201204	E/C GEN. 22UF 16V RV2 SMD	C55	1
130	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C56	1
131	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C57	1
132	M	011131035115	C/M MULTI 0.01UF 50V X7R 0805	C58	1
133	M	010114711211	E/C GEN. 470UF 16V 105' F	C60	1
134	M	010114701204	E/C GEN. 47UF 16V RV2 SMD	C61	1
135	M	011134705105	C/M MULTI 47PF 50V NPO 0805	C62	1
136	M	011131035115	C/M MULTI 0.01UF 50V X7R 0805	C64	1
137	M	010111091504	E/C GEN. 1.0UF 50V RV2 SMD	C65	1
138	M	011131035115	C/M MULTI 0.01UF 50V X7R 0805	C66	1
139	M	010111091504	E/C GEN. 1.0UF 50V RV2 SMD	C67	1
140	M	011131035115	C/M MULTI 0.01UF 50V X7R 0805	C68	1
141	M	010111091504	E/C GEN. 1.0UF 50V RV2 SMD	C69	1
142	M	011134705105	C/M MULTI 47PF 50V NPO 0805	C70	1
143	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C81	1
144	M	013010031859	RES. CF 100Kohm 1/8W J 1206	C82	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
145	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C83	1
146	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C85	1
147	M	010113311211	E/C GEN. 330UF 16V 105' F	C86	1
148	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C87	1
149	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C88	1
150	M	011131045135	C/M MULTI 0.1UF 50V Y5V 0805	C89	1
151	M	010113311211	E/C GEN. 330UF 16V 105' F	C90	1
152	M	010112201204	E/C GEN. 22UF 16V RV2 SMD	C91	1
153	M	010121001501	E/C B-P 10UF 50V 85'F	C92	1
154	M	011131015105	C/M MULTI 100PF 50V NPO 0805	C96	1
155	M	011133315105	C/M MULTI 330PF 50V NPO 0805	C97	1
156	M	011134705105	C/M MULTI 47PF 50V NPO 0805	C98	1
157	M	039050001053	GEN. DIODE 1N4148 SMD	D01	1
158	M	039050001053	GEN. DIODE 1N4148 SMD	D02	1
159	M	039050001053	GEN. DIODE 1N4148 SMD	D05	1
160	M	039050001053	GEN. DIODE 1N4148 SMD	D06	1
161	M	039050001053	GEN. DIODE 1N4148 SMD	D07	1
162	M	039050001053	GEN. DIODE 1N4148 SMD	D08	1
163	M	039050001053	GEN. DIODE 1N4148 SMD	D09	1
164	M	039050001053	GEN. DIODE 1N4148 SMD	D10	1
165	M	039050001053	GEN. DIODE 1N4148 SMD	D11	1
166	M	039050001053	GEN. DIODE 1N4148 SMD	D12	1
167	M	039050001053	GEN. DIODE 1N4148 SMD	D15	1
168	M	039050001053	GEN. DIODE 1N4148 SMD	D17	1
169	M	039050001053	GEN. DIODE 1N4148 SMD	D18	1
170	M	039030002012	FAST DIODE 15DF4 T	D19	1
171	M	039030002012	FAST DIODE 15DF4 T	D20	1
172	M	039050001053	GEN. DIODE 1N4148 SMD	D24	1
173	M	043070031939	IC AM100(B) SMD 160PIN (PQFP)	IC02	1
174	M	043070006015	IC TLC2933IPWR SMD 14PIN (TSSOP)	IC03	1
175	M	043070019040	IC MTV118P-011 SMD 16PIN	IC04	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
176	M	043010001004	IC MM74HC00M SMD-14	IC06	1
177	M	043030004143	IC HT24C08 DIP 8PIN	IC07	1
178	M	020125408000	IC SOCKET 2.54MM 8PIN	IC07S	1
179	M	043040057839	IC AM30 SMD 100PIN (MQFP)	IC08	1
180	M	043040056028	IC ICS1523M SMD 24PIN	IC09	1
181	M	043060004307	IC TL431CZ TO-92 T	IC11	1
182	M	043000006004	IC CD4049UBM SMD 16PIN	IC12	1
183	M	043010030004	IC DM74LS14MX SMD 14PIN	IC15	1
184	M	043000008004	IC MM74HC4053WMX SMD 16PIN	IC16	1
185	M	043010005005	IC 74HC86AFN SMD-14 T	IC17	1
186	M	042010013601	POWER MOS IRF7304 SMD 8PIN	IC18	1
187	M	042010013601	POWER MOS IRF7304 SMD 8PIN	IC19	1
188	M	043040002004	IC LM339M SMD-14 T	IC20	1
189	M	042010013601	POWER MOS IRF7304 SMD 8PIN	IC21	1
190	M	042010013601	POWER MOS IRF7304 SMD 8PIN	IC22	1
191	M	043010007004	IC 74HC14 SMD-14	IC23	1
192	M	043030004143	IC HT24C08 DIP 8PIN	IC24	1
193	M	020125408000	IC SOCKET 2.54MM 8PIN	IC24S	1
194	M	043050024140	IC MTV112N DIP 40PIN (OTP)	IC25	1
195	M	020125440000	IC SOCKET 2.54MM 40PIN	IC25S	1
196	M	043000002010	IC MC14013BDR2 SMD-14	IC30	1
197	M	043040049402	IC M52743BSP SDIP 36PIN	IC31	1
198	M	043060004307	IC TL431CZ TO-92 T	IC33	1
199	M	044020000020	LED L-934GD 3 φ GREEN	LED1	1
200	M	037000001010	FERRITE CORE RH 3.5X6X1.0(W)X2	L02	1
201	M	037000001110	FERRITE CORE W8 R6H 6X10 2 1/2 T	L07	1
202	M	034468800603	PEAKING COIL 0.68UH 1/4W K 2012	L08	1
203	M	013047091858	RES. CF 47ohm 1/8W J 0805	L09	1
204	M	034468800603	PEAKING COIL 0.68UH 1/4W K 2012	L11	1
205	M	037000004252	Chip Bead Core 30ohm (MLB-201209-0030P-N1)	L13	1
206	M	034468800603	PEAKING COIL 0.68UH 1/4W K 2012	L15	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
207	M	034468800603	PEAKING COIL 0.68UH 1/4W K 2012	L16	1
208	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	L20	1
209	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	L21	1
210	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	L22	1
211	M	037000003133	Chip Bead Core 80ohm (FCM1608K-800T07)	L23	1
212	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	L30	1
213	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	L31	1
214	M	037000001110	FERRITE CORE W8 R6H 6X10 2 1/2 T	L32	1
215	M	036110000060	CHOKE COIL L:160UH 1A	L33	1
216	M	036110000060	CHOKE COIL L:160UH 1A	L34	1
217	M	034468800603	PEAKING COIL 0.68UH 1/4W K 2012	L35	1
218	M	017122420153	PCB MAIN BD 204*121*1.6T FR4 4M	PCB01	1
219	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR01	1
220	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR02	1
221	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR03	1
222	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR04	1
223	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR05	1
224	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR06	1
225	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR07	1
226	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR08	1
227	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR09	1
228	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR10	1
229	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR11	1
230	M	014133093851	ARRAY RES. A(X) 33ohm 4R J 8P	PR12	1
231	M	014110023851	ARRAY RES. A(X) 10Kohm 4R J 8P	PR13	1
232	M	014147003851	ARRAY RES. A(X) 470ohm 4R J 8P	PR14	1
233	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR15	1
234	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR16	1
235	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR17	1
236	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR18	1
237	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR19	1

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MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
238	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR20	1
239	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR21	1
240	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR22	1
241	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR23	1
242	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR24	1
243	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR25	1
244	M	014122003851	ARRAY RES. A(X) 220ohm 4R J 8P	PR26	1
245	M	014110023851	ARRAY RES. A(X) 10Kohm 4R J 8P	PR27	1
246	M	014110023851	ARRAY RES. A(X) 10Kohm 4R J 8P	PR28	1
247	M	014147093851	ARRAY RES. A(X) 47ohm 4R J 8P	PR29	1
248	M	014110023851	ARRAY RES. A(X) 10Kohm 4R J 8P	PR31	1
249	M	041050002610	TRANSISTOR MMBT3906LT1 SMD	Q01	1
250	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q02	1
251	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q03	1
252	M	041020003106	TRANSISTOR 2SC1213AC TO-92 T	Q08	1
253	M	041050002610	TRANSISTOR MMBT3906LT1 SMD	Q09	1
254	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q10	1
255	M	041050002610	TRANSISTOR MMBT3906LT1 SMD	Q11	1
256	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q12	1
257	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q13	1
258	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q14	1
259	M	041050002610	TRANSISTOR MMBT3906LT1 SMD	Q15	1
260	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q19	1
261	M	041050001610	TRANSISTOR MMBT3904LT1 SMD T	Q20	1
262	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R02	1
263	M	013075091858	RES. CF 75ohm 1/8W J 0805	R04	1
264	M	013075001858	RES. CF 750ohm 1/8W J 0805	R05	1
265	M	013027001858	RES. CF 270ohm 1/8W J 0805	R06	1
266	M	013033011858	RES. CF 3.3Kohm 1/8W J 0805	R07	1
267	M	013010091858	RES. CF 10ohm 1/8W J 0805	R08	1
268	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R09	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
269	M	013047001858	RES. CF 470ohm 1/8W J 0805	R10	1
270	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R100	1
271	M	013043021858	RES. CF 43Kohm 1/8W J 0805	R104	1
272	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R105	1
273	M	013022021858	RES. CF 22Kohm 1/8W J 0805	R106	1
274	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R107	1
275	M	013043091859	RES. CF 43ohm 1/8W J 1206	R108	1
276	M	013010011850	RES. CF 1.0Kohm 1/8W J A	R11	1
277	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R110	1
278	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R111	1
279	M	013043021858	RES. CF 43Kohm 1/8W J 0805	R112	1
280	M	013033011858	RES. CF 3.3Kohm 1/8W J 0805	R114	1
281	M	013033011858	RES. CF 3.3Kohm 1/8W J 0805	R115	1
282	M	013022091858	RES. CF 22ohm 1/8W J 0805	R116	1
283	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R117	1
284	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R118	1
285	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R119	1
286	M	013039011858	RES. CF 3.9Kohm 1/8W J 0805	R12	1
287	M	013027001858	RES. CF 270ohm 1/8W J 0805	R121	1
288	M	013027001858	RES. CF 270ohm 1/8W J 0805	R122	1
289	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R123	1
290	M	013022091858	RES. CF 22ohm 1/8W J 0805	R124	1
291	M	013022091858	RES. CF 22ohm 1/8W J 0805	R125	1
292	M	013022091858	RES. CF 22ohm 1/8W J 0805	R126	1
293	M	013022091858	RES. CF 22ohm 1/8W J 0805	R127	1
294	M	013000001859	RES. CF 0.0ohm 1/8W J 1206	R131	1
295	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R132	1
296	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R133	1
297	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R136	1
298	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R137	1

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MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
299	M	013022021858	RES. CF 22Kohm 1/8W J 0805	R138	1
300	M	013022091858	RES. CF 22ohm 1/8W J 0805	R140	1
301	M	013010001858	RES. CF 100ohm 1/8W J 0805	R142	1
302	M	013022091858	RES. CF 22ohm 1/8W J 0805	R143	1
303	M	013047001858	RES. CF 470ohm 1/8W J 0805	R144	1
304	M	013012021850	RES. CF 12Kohm 1/8W J A	R148	1
305	M	013022091858	RES. CF 22ohm 1/8W J 0805	R168	1
306	M	013022091858	RES. CF 22ohm 1/8W J 0805	R169	1
307	M	013022091858	RES. CF 22ohm 1/8W J 0805	R170	1
308	M	013022091858	RES. CF 22ohm 1/8W J 0805	R171	1
309	M	013022021858	RES. CF 22Kohm 1/8W J 0805	R18	1
310	M	013010001858	RES. CF 100ohm 1/8W J 0805	R19	1
311	M	013022091858	RES. CF 22ohm 1/8W J 0805	R197	1
312	M	013022091858	RES. CF 22ohm 1/8W J 0805	R198	1
313	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R204	1
314	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R205	1
315	M	013047091858	RES. CF 47ohm 1/8W J 0805	R215	1
316	M	013010011858	RES. CF 1.0Kohm 1/8W J 0805	R216	1
317	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R217	1
318	M	013010011858	RES. CF 1.0Kohm 1/8W J 0805	R26	1
319	M	013030011858	RES. CF 3.0Kohm 1/8W J 0805	R27	1
320	M	013010011858	RES. CF 1.0Kohm 1/8W J 0805	R28	1
321	M	013027001858	RES. CF 270ohm 1/8W J 0805	R31	1
322	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R32	1
323	M	013010021850	RES. CF 10Kohm 1/8W J A	R33	1
324	M	013022001858	RES. CF 220ohm 1/8W J 0805	R34	1
325	M	013022001858	RES. CF 220ohm 1/8W J 0805	R35	1
326	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R36	1
327	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R37	1
328	M	013010001858	RES. CF 100ohm 1/8W J 0805	R38	1
329	M	013005081859	RES. CF 0.5ohm 1/8W J 1206	R39	1

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MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
330	M	013005081859	RES. CF 0.5ohm 1/8W J 1206	R40	1
331	M	013075091859	RES. CF 75ohm 1/8W J 1206	R41	1
332	M	013075091859	RES. CF 75ohm 1/8W J 1206	R42	1
333	M	013075091859	RES. CF 75ohm 1/8W J 1206	R43	1
334	M	013015091859	RES. CF 15ohm 1/8W J 1206	R44	1
335	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R45	1
336	M	013047001858	RES. CF 470ohm 1/8W J 0805	R46	1
337	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R47	1
338	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R48	1
339	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R49	1
340	M	013000001858	RES. CF 0.0ohm 1/8W J 0805	R50	1
341	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R51	1
342	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R52	1
343	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R53	1
344	M	013022011858	RES. CF 2.2Kohm 1/8W J 0805	R54	1
345	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R55	1
346	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R56	1
347	M	013010091858	RES. CF 10ohm 1/8W J 0805	R57	1
348	M	013010091858	RES. CF 10ohm 1/8W J 0805	R59	1
349	M	013010091858	RES. CF 10ohm 1/8W J 0805	R61	1
350	M	013022091858	RES. CF 22ohm 1/8W J 0805	R65	1
351	M	013047081859	RES. CF 4.7ohm 1/8W J 1206	R66	1
352	M	013022001859	RES. CF 220ohm 1/8W J 1206	R67	1
353	M	013022001858	RES. CF 220ohm 1/8W J 0805	R68	1
354	M	013047091858	RES. CF 47ohm 1/8W J 0805	R69	1
355	M	013047091858	RES. CF 47ohm 1/8W J 0805	R70	1
356	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R71	1
357	M	037000002143	CHIP BEAD CORE 600ohm 1608M T	R72	1
358	M	037000002143	CHIP BEAD CORE 600ohm 1608M T	R73	1
359	M	013022001858	RES. CF 220ohm 1/8W J 0805	R74	1
360	M	013022001858	RES. CF 220ohm 1/8W J 0805	R75	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0272-0150 LCD MAIN BD ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
361	M	013075001858	RES. CF 750ohm 1/8W J 0805	R77	1
362	M	013010011859	RES. CF 1.0Kohm 1/8W J 1206	R78	1
363	M	013010011858	RES. CF 1.0Kohm 1/8W J 0805	R80	1
364	M	013075001858	RES. CF 750ohm 1/8W J 0805	R81	1
365	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R82	1
366	M	013022091858	RES. CF 22ohm 1/8W J 0805	R84	1
367	M	013005081859	RES. CF 0.5ohm 1/8W J 1206	R85	1
368	M	013005081859	RES. CF 0.5ohm 1/8W J 1206	R86	1
369	M	013022091858	RES. CF 22ohm 1/8W J 0805	R87	1
370	M	013010011858	RES. CF 1.0Kohm 1/8W J 0805	R89	1
371	M	013022001859	RES. CF 220ohm 1/8W J 1206	R90	1
372	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R91	1
373	M	013047021858	RES. CF 47Kohm 1/8W J 0805	R92	1
374	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R93	1
375	M	013082021858	RES. CF 82Kohm 1/8W J 0805	R94	1
376	M	013047011858	RES. CF 4.7Kohm 1/8W J 0805	R95	1
377	M	013022021858	RES. CF 22Kohm 1/8W J 0805	R96	1
378	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R97	1
379	M	013022021858	RES. CF 22Kohm 1/8W J 0805	R98	1
380	M	013010021858	RES. CF 10Kohm 1/8W J 0805	R99	1
381	M	030012003150	D-SUB FEMALE 90' 15P 3ROW	W01	1
382	M	045120000464	WAFER 2.00MM 4P 90' KINK	W02	1
383	M	045120000264	WAFER 2.00MM 2P 90' KINK	W03	1
384	M	045120000964	WAFER 2.00MM 9P 90' KINK	W04	1
385	M	045120000564	WAFER 2.00MM 5P 90' KINK	W05	1
386	M	030180000801	Conn. B to B FX8C 80P F.M (FX8C-80S-SV)	W07	1
387	M	030213600011	DC POWER JACK (2DC-0034I-100)	W09	1
388	M	028011000013	X'TAL 11.0592MHZ	XR02	1
389	M	040014512000	ZENER 15-2 14.5-15.1V 1/2W	ZD02	1
390	M	040014512000	ZENER 15-2 14.5-15.1V 1/2W	ZD03	1
391	M	040005112000	ZENER 5C3 5.1-5.3V 1/2W	ZD04	1

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COMPLETE PARTS LIST

MODULE NO: 3150-0562-0312 LCD PACKING ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
392	M	030070122103	AC TO DC ADAPTOR (UP06031120A-3PIN)	AD01	1
	CS	030070124054	AC TO DC ADAPTOR 12/4.2A (LSE9901B1250)		
393	M	032044000010	POWER CORD 6FT 110V UL/CSA AL	PC01	1
394	M	032034000010	POWER CORD 6FT 220V VDE	PC02	1
395	M	032104000060	S.CABLE 1800MM 15(3R-3R) 3+6C / PC99	SG01	1
396	M	192510000530	EPS FOAM-B (VG151)	1P11	1
397	M	192510000520	EPS FOAM-A (VG151)	1P12	1
398	M	194716000230	INF DISK NOKIA 510L	1P13	1
399	M	192511000070	PE BAG 450*600*0.04T	1P14	1
400	M	193614000050	TCO99 LBL	1P15	1
401	M	192511000402	PE BAG 360LX200WX0.04T/EUROPE	1P16	1
402	M	192512002060	CARTON NOKIA 510L	1P17	1
403	M	192513002130	MANUAL NOKIA 510L	1P18	1
404	M	193611002340	BACK LBL NOKIA 510L	1P19	1

MODULE NO: 3150-0632-0331 LCD PANEL ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
405	M	171201000322	CHASSIS BRACKET (VG150)	FP01	1
406	M	170115000030	WIRE SADDLE (CH-01C)	FP01M	3
407	M	170115000040	WIRE SADDLE (CH-20)	FP01N	1
408	M	021101501972	LCD MODULE 15.0" TFT CLAA150XA03	FP02	1
	CS	021101501255	LCD MODULE 15.0" TFT AA150XA03(ADI)		
409	M	172005031000	MAC. SCREW-MBSFW M3.0*10.0L,ZN	FP02M	4
410	M	194717001100	GASKET BLOCK (20.0*13.0*10.0)	FP02N	4
411	M	170101031070	Front Panel Cab. G7397 PC+ABS NOKIA 510L	FP03	1
412	M	170104025000	BUTTON (AX150T)	FP03M	1
413	M	193610000090	NAME PLATE NOKIA 510L	FP03N	1
414	M	172100031020	TAP. SCREW-TB #3.0*10.0L,NI	FP03O	1
415	M	315000120156	LCD DISPLAY BD ASS'Y (VG150)	FP03P	1

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COMPLETE PARTS LIST

MODULE NO. 3150-0632-0331 LCD PANEL ASS'Y					
NO	M/S	PART NO	DESCRIPTION	LOC	Q'TY
416	M	046010090021	WH PH9P-PH9P 1061#26 175MM CORE*1	FP03Q	1
417	M	315002720150	LCD MAIN BD ASS'Y (NOKIA 510L)	FP04	1
418	M	171201000381	SUPPORT BRACKET FOR M/B	FP04M	1
419	M	172000030410	MAC. SCREW-MB M3.0*4.0L,ZN-CC	FP04N	1
420	M	171205000211	SHIELD BRACKET FOR M/B	FP04O	1
421	M	172000030410	MAC. SCREW-MB M3.0*4.0L,ZN-CC	FP04P	1
422	M	170109000061	INSULATOR FOR M/B (VG150)	FP04Q	1
423	M	194717000020	SHIELDING AL. TAPE (45.0*25.0)	FP04R	2
424	M	046029000101	WH FPCB 80P-8BIT 134*119.35MM 1/1Z	FP05	1
425	M	194717000120	SHIELDING AL.TAPE (150.0*65.0)	FP05M	1
426	M	050001010091	INVERTER DC/AC (TAD275-8 REV C)	FP06	1
427	M	172000030410	MAC. SCREW-MB M3.0*4.0L,ZN-CC	FP06M	22
428	M	046010050052	WH PH5P-PH5P 1007#24 170MM	FP06N	1
429	M	171205000221	SHIELD FOR INVERTER (VG150)	FP06O	1
430	M	171209000090	HINGE ASS'Y-R (AX150/VG150)	FP07	1
431	M	172050030420	MAC. SCREW-MI M3.0*4.0L,NI	FP06P	4
432	M	171209000090	HINGE ASS'Y-R (AX150/VG150)	FP07	1
433	M	172015041220	MAC. SCREW-MPSWF M4.0*12.0L,NI	FP07M	1
434	M	172015041220	MAC. SCREW-MPSWF M4.0*12.0L,NI	FP07N	1
435	M	171209000100	HINGE ASS'Y-L (AX150/VG150)	FP08	1
436	M	172015041220	MAC. SCREW-MPSWF M4.0*12.0L,NI	FP08M	1
437	M	172015041220	MAC. SCREW-MPSWF M4.0*12.0L,NI	FP08N	7
438	M	170108000061	DECORATION PLATE (VG150)	FP09	1
439	M	172100031020	TAP. SCREW-TB #3.0*10.0L,NI	FP09M	1
440	M	170102014000	REAR COVER CAB. (AX150T)	FP10	1
441	M	172100031020	TAP. SCREW-TB #3.0*10.0L,NI	FP10M	10
442	M	170112001000	REAR DOOR (VG150)	FP11	1
443	M	170107000020	LENS FOR LCD	FP12	1

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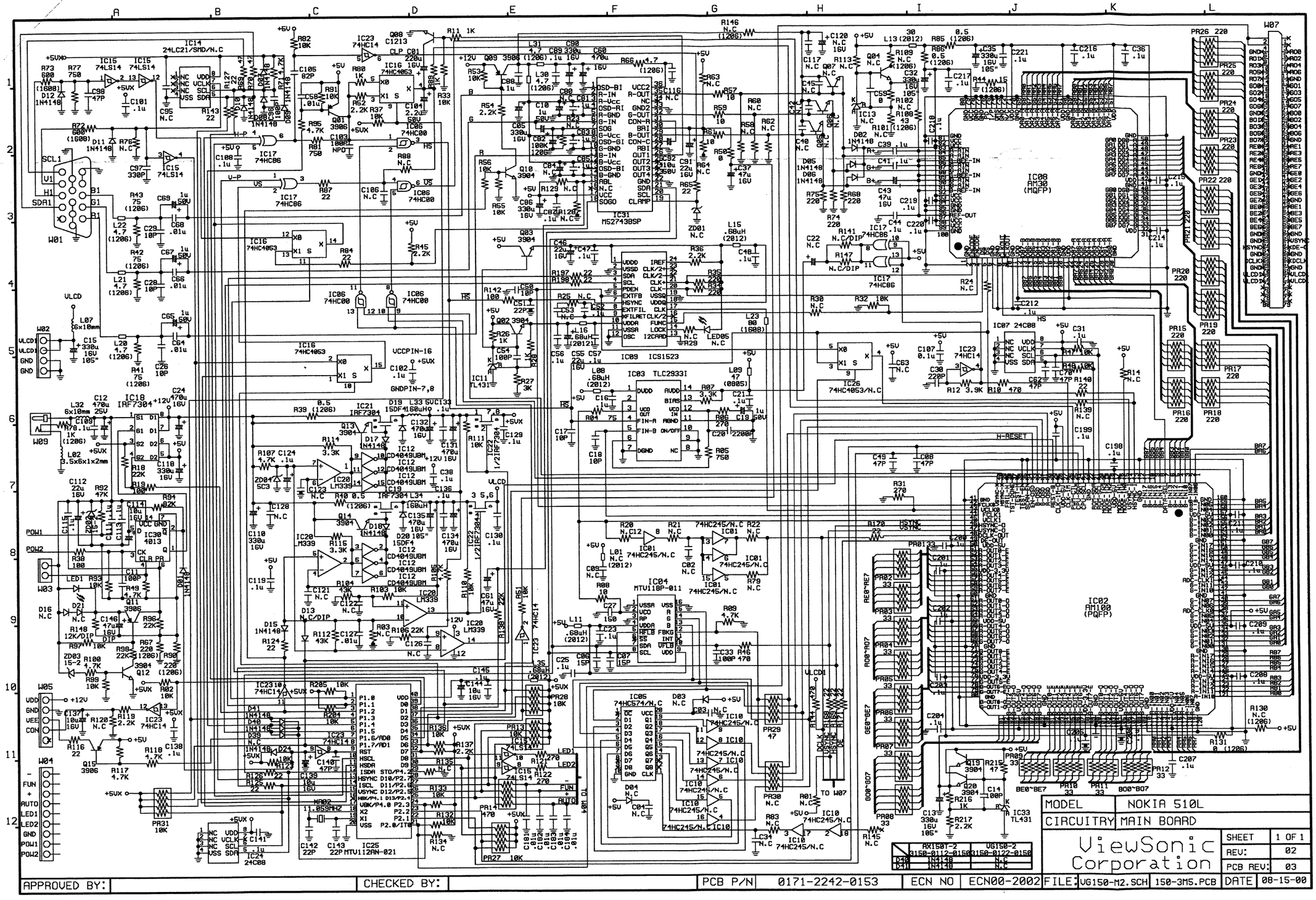
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IC12 CD4049UBM
IC20 LM339
IC21 IRF7304
IC18 IRF7304
IC22 IRF7304
IC02 AM100 (PQFP)
IC08 AM30 (MQFP)
IC07 24C08
IC24 24C08
IC25 MTV112RN-021
IC26 74HC4053/N.C
IC33 TL431
W01
W02
W03
W04
W05
W07
W09
SCL1
SDA1
VLCD
POW1
POW2
H-RESET
MODEL NOKIA 510L
CIRCUITRY MAIN BOARD
ViewSonic Corporation
SHEET 1 OF 1
REV: 02
PCB REV: 03
APPROVED BY:
CHECKED BY:
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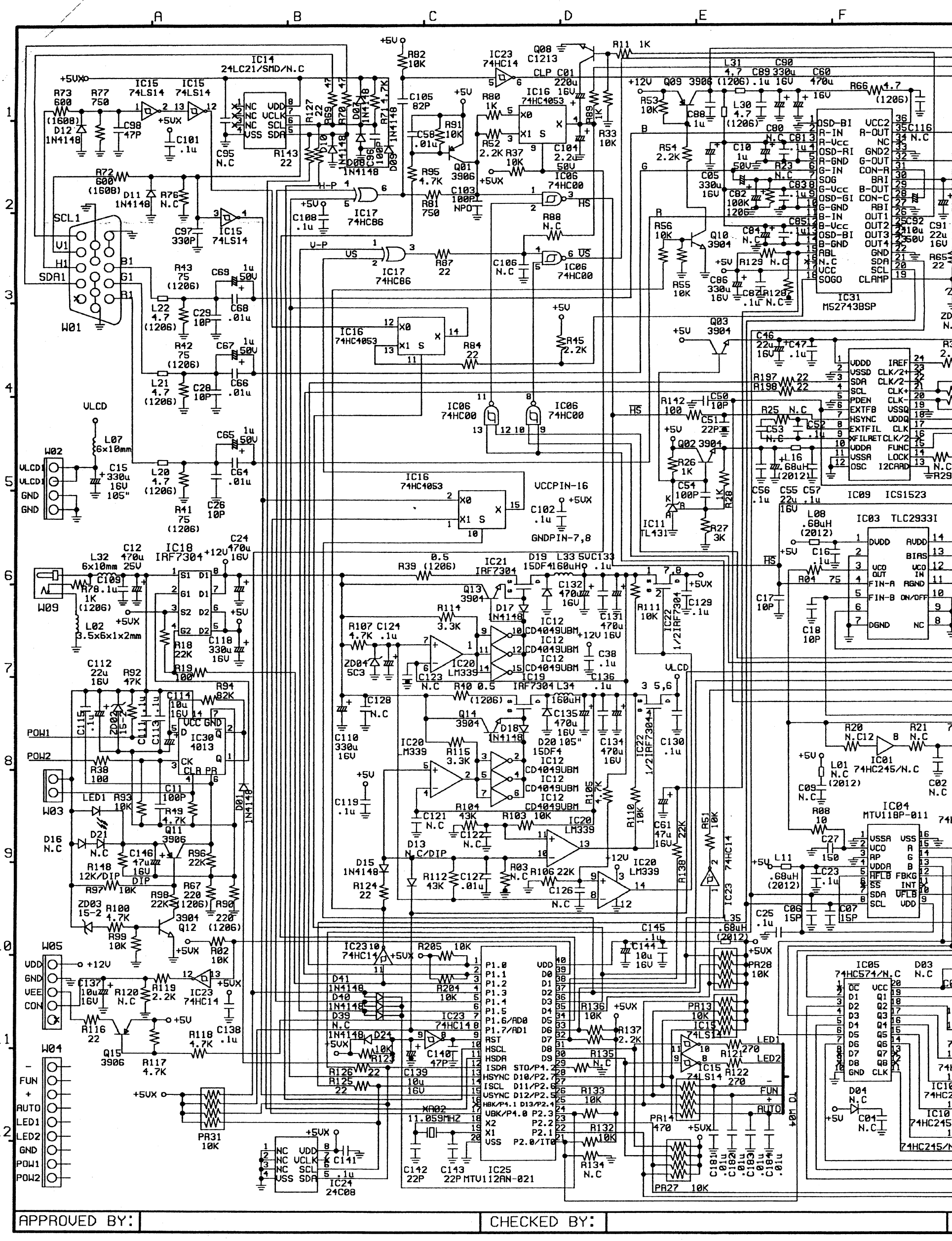
ECN NO ECN00-2002
FILE: VG150-M2.SCH 150-3M5.PCB
DATE 08-15-00



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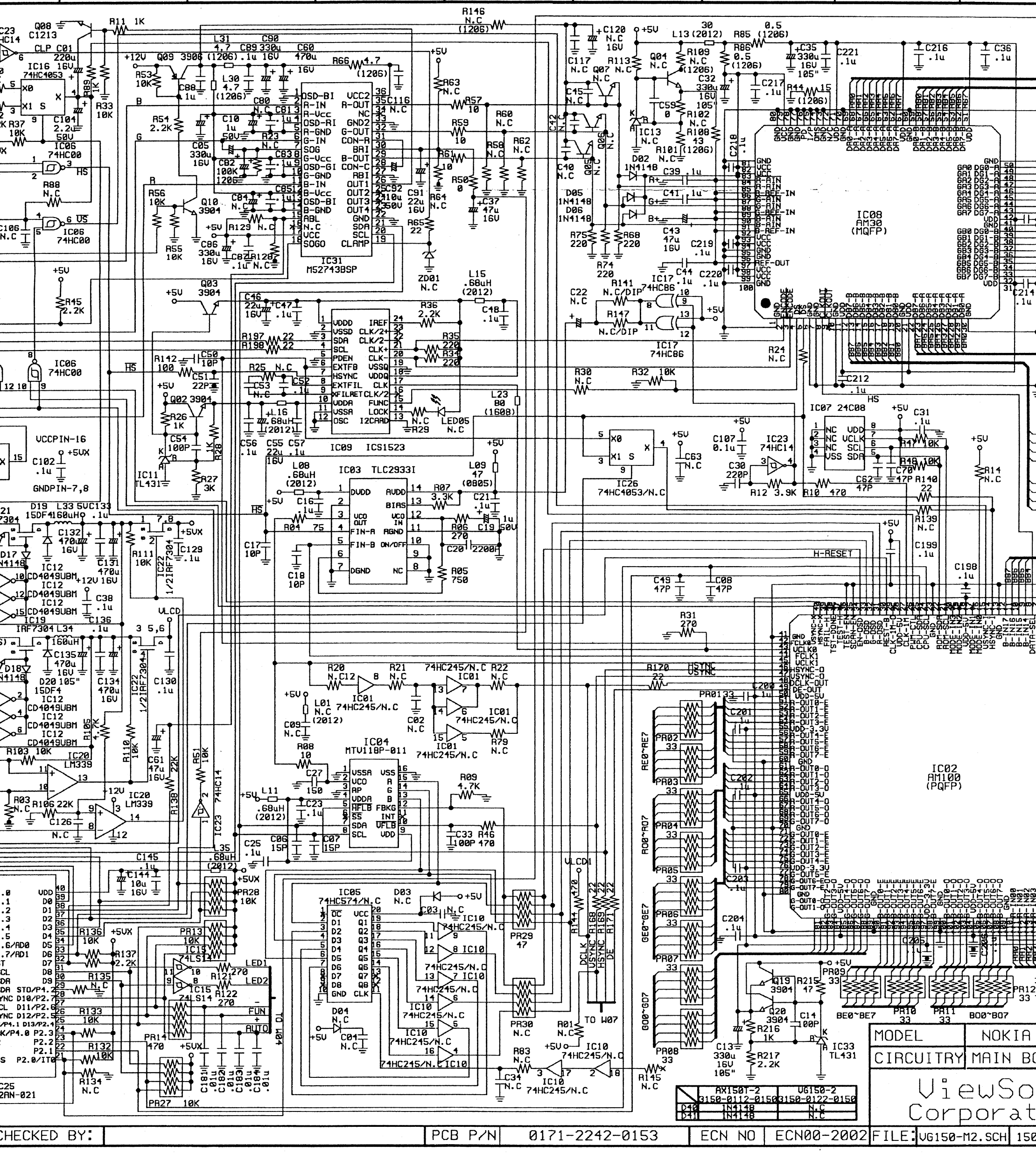

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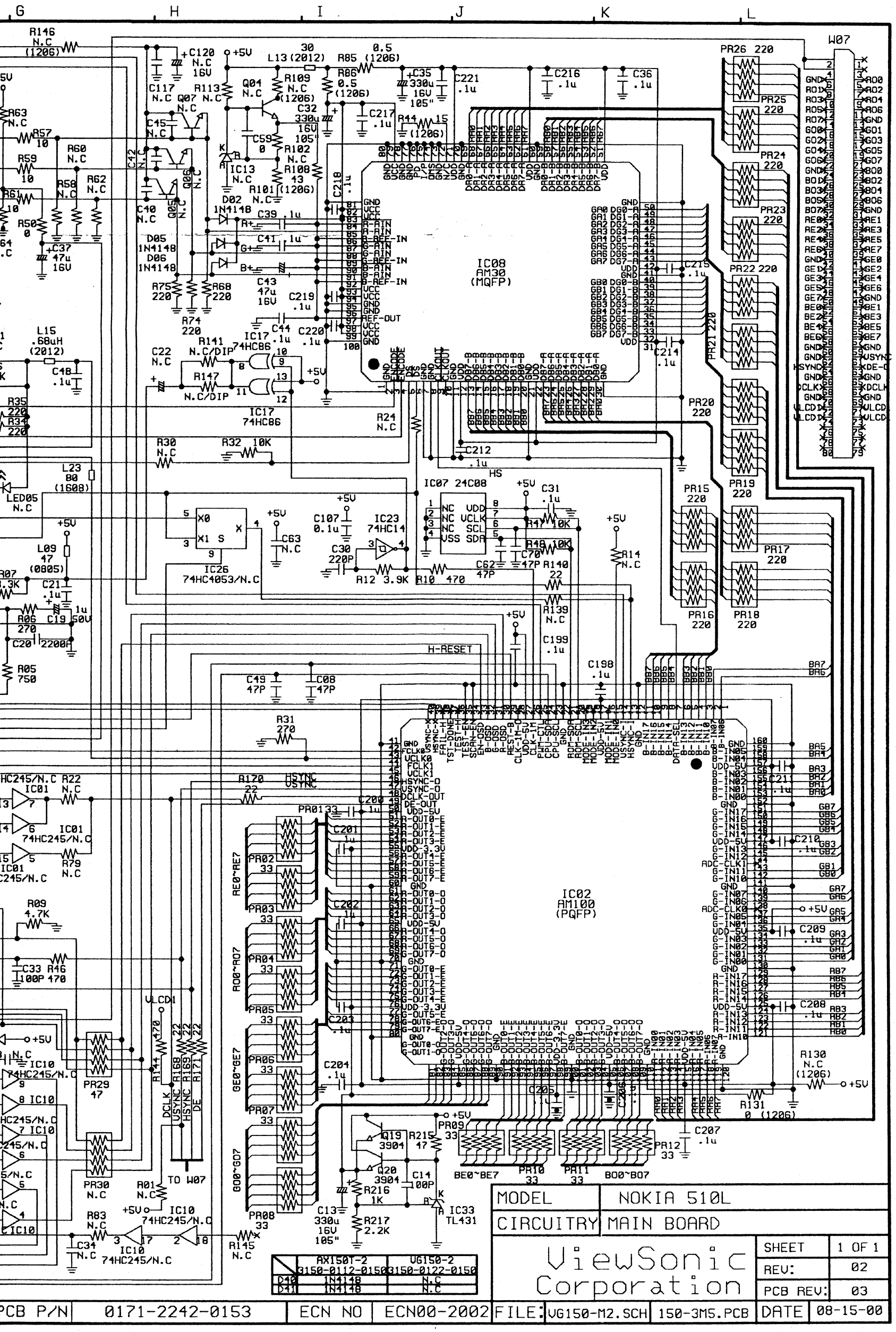

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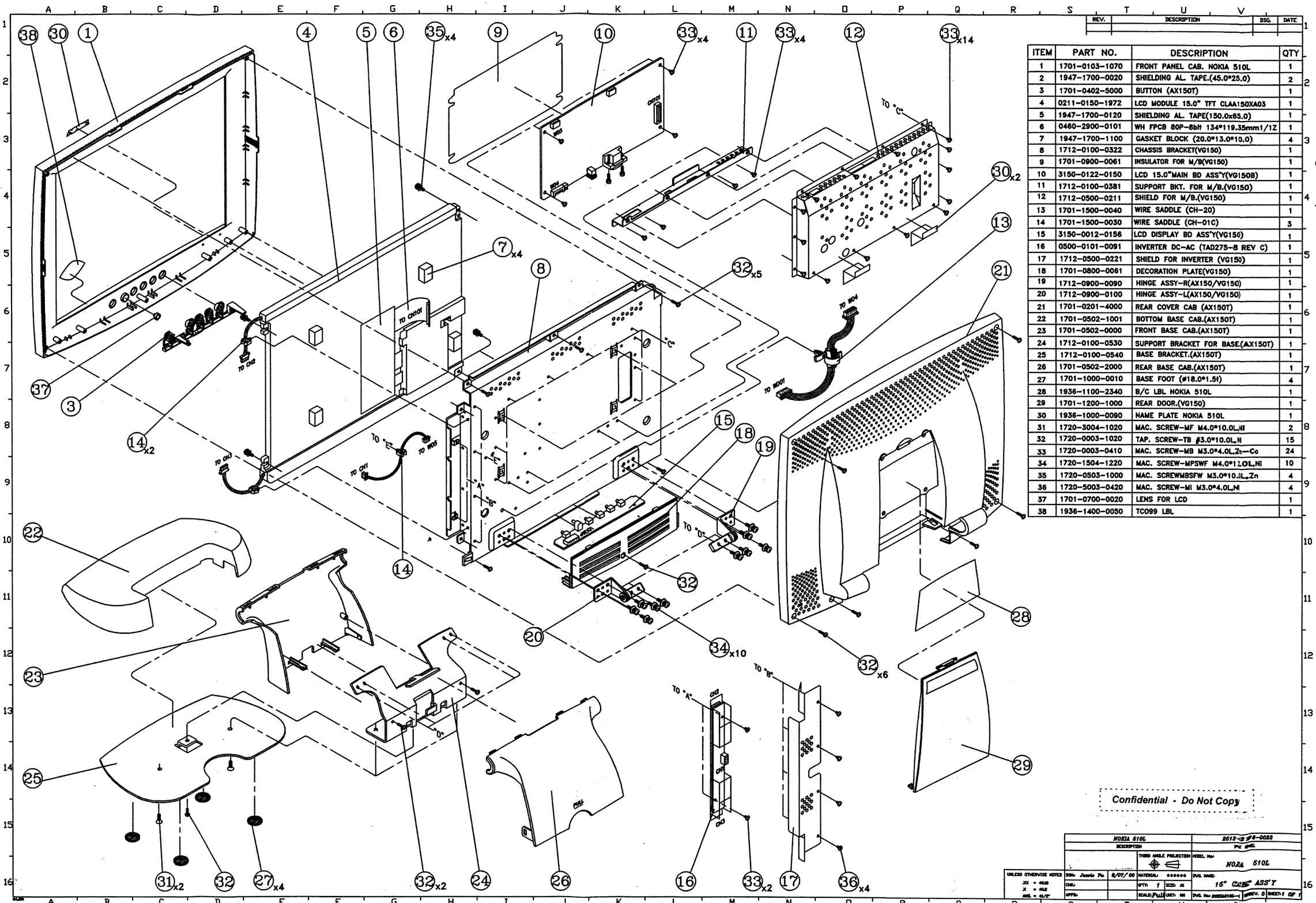
D41	1N4148	N.C



REV.	DESCRIPTION	DSG.	DATE

ITEM	PART NO.	DESCRIPTION	QTY
1	1701-0103-1070	FRONT PANEL CAB. NOKIA 510L	1
2	1947-1700-0020	SHIELDING AL. TAPE.(45.0*25.0)	2
3	1701-0402-5000	BUTTON (AX150T)	1
4	0211-0150-1972	LCD MODULE 15.0" TFT CLAA150XA03	1
5	1947-1700-0120	SHIELDING AL. TAPE(150.0x65.0)	1
6	0460-2900-0101	WH FPCB 80P-8bit 134*119.35mm1/1Z	1
7	1947-1700-1100	GASKET BLOCK (20.0*13.0*10.0)	4
8	1712-0100-0322	CHASSIS BRACKET(VG150)	1
9	1701-0900-0061	INSULATOR FOR M/B(VG150)	1
10	3150-0122-0150	LCD 15.0"MAIN BD ASS'Y(VG150B)	1
11	1712-0100-0381	SUPPORT BKT. FOR M/B.(VG150)	1
12	1712-0500-0211	SHIELD FOR M/B.(VG150)	1
13	1701-1500-0040	WIRE SADDLE (CH-20)	1
14	1701-1500-0030	WIRE SADDLE (CH-01C)	3
15	3150-0012-0156	LCD DISPLAY BD ASS'Y(VG150)	1
16	0500-0101-0091	INVERTER DC-AC (TAD275-B REV C)	1
17	1712-0500-0221	SHIELD FOR INVERTER (VG150)	1
18	1701-0800-0061	DECORATION PLATE(VG150)	1
19	1712-0900-0090	HINGE ASSY-R(AX150/VG150)	1
20	1712-0900-0100	HINGE ASSY-L(AX150/VG150)	1
21	1701-0201-4000	REAR COVER CAB (AX150T)	1
22	1701-0502-1001	BOTTOM BASE CAB.(AX150T)	1
23	1701-0502-0000	FRONT BASE CAB.(AX150T)	1
24	1712-0100-0530	SUPPORT BRACKET FOR BASE(AX150T)	1
25	1712-0100-0540	BASE BRACKET.(AX150T)	1
26	1701-0502-2000	REAR BASE CAB.(AX150T)	1
27	1701-1000-0010	BASE FOOT (ø18.0*1.5t)	4
28	1936-1100-2340	B/C LBL NOKIA 510L	1
29	1701-1200-1000	REAR DOOR.(VG150)	1
30	1936-1000-0090	NAME PLATE NOKIA 510L	1
31	1720-3004-1020	MAC. SCREW-MF M4.0*10.0L,NI	2
32	1720-0003-1020	TAP. SCREW-TB ø3.0*10.0L,N	15
33	1720-0003-0410	MAC. SCREW-MB M3.0*4.0L,Zn-Cc	24
34	1720-1504-1220	MAC. SCREW-MPSWF M4.0*12.0L,NI	10
35	1720-0503-1000	MAC. SCREWMBSFW M3.0*10.0L,Zn	4
36	1720-5003-0420	MAC. SCREW-MI M3.0*4.0L,NI	4
37	1701-0700-0020	LENS FOR LCD	1
38	1936-1400-0050	TC099 LBL	1

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NOKIA 510L			2513-1B 96-0033
DESCRIPTION			Per BOM
		THIRD ANGLE PROJECTION	MODEL No: NOKIA 510L
UNLESS OTHERWISE NOTED: DSN: Jessie Yu 6/07/00; CHK: ; APPD: ; MATERIAL: ; QTY: 1; SCALE: Full; UNIT: MM; SIZE: A1			DWG NAME: 15" CRT ASS'Y
			DWG No: 2513A0162-1 REV: 0 SHEET: 1 OF 1